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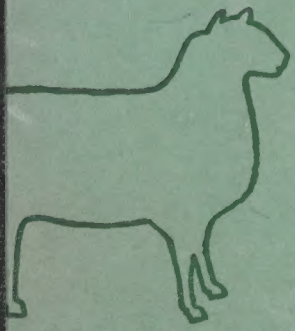

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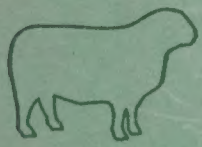

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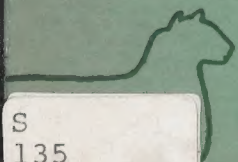

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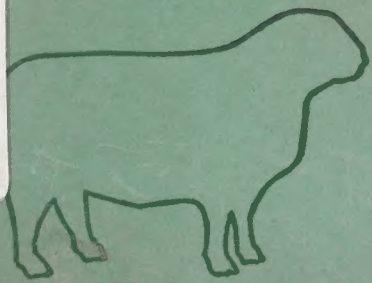

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UNIVERSITY OF ALBERTA
FACULTY OF AGRICULTURE

Sheep Production in Alberta

BY

DEPARTMENT OF ANIMAL SCIENCE

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Sheep Production in Alberta

BY

J. E. BOWSTEAD

INTRODUCTION

Most authorities agree that the sheep industry in Canada can be materially increased with little danger of overproduction. Canada consumes six or seven times more wool than is produced and several million pounds of lamb have been imported during recent years to meet the demand of Canadian people.

Between 1944 and 1951 the sheep population in Canada as well as in the province of Alberta declined rapidly. In Canada the numbers decreased from 3,726,000 head in 1944 to 1,461,000 in 1951, while in Alberta the numbers were reduced from 1,023,000 to 330,500 head during the same period. Since 1951 prices for lamb have become more favorable in relation to prices of other meats, and the price of wool has increased. The improvement in prices since 1951 has resulted in a renewed interest in sheep raising and an increase in sheep population. By June, 1958, the sheep population in Canada had gradually increased to 1,696,000 head and in Alberta to 470,000 head. The increase in numbers during the past few years has been due to increases in farm flocks since there has been a tendency for the number of range sheep to decline.

As a result of the favorable outlook for the sheep business, it may be anticipated that there will be continued expansion in the number and size of farm flocks. This bulletin is especially directed to flock owners with the hope that the information it contains will assist them in making sheep raising a more profitable enterprise. Improvements in feeding, breeding and management practices will result in increased income from the sale of both lambs and wool.

THE PLACE OF SHEEP ON THE ALBERTA FARM

The soil and climatic conditions in most parts of Alberta are favorable to the raising of sheep. The sheep raising enterprise has been profitable where the animals have been intelligently fed and cared for. The raising of sheep is especially suited to the recognized mixed farming areas and to districts where soil fertility problems exist. While it is true that the scavenging qualities of sheep may be over-emphasized, at the same time it must be recognized that

as a means of utilizing the vegetation on waste places, summer-fallow and stubble fields, sheep have an advantage over other classes of farm animals. That the flock will return a tidy revenue and help to keep the farm clean is not a mere conjecture. One needs only to consider the enthusiasm of farmers who own flocks of varying sizes to appreciate that they constitute a vital part of the general farm scheme.

A large capital investment is not required to become established in the sheep business. More mature animals can be purchased with a given amount of money and the rate of natural increase is greater than that for other kinds of livestock except swine. This means that with a comparatively small initial investment it is possible in a few years to establish a farm flock of reasonable size.

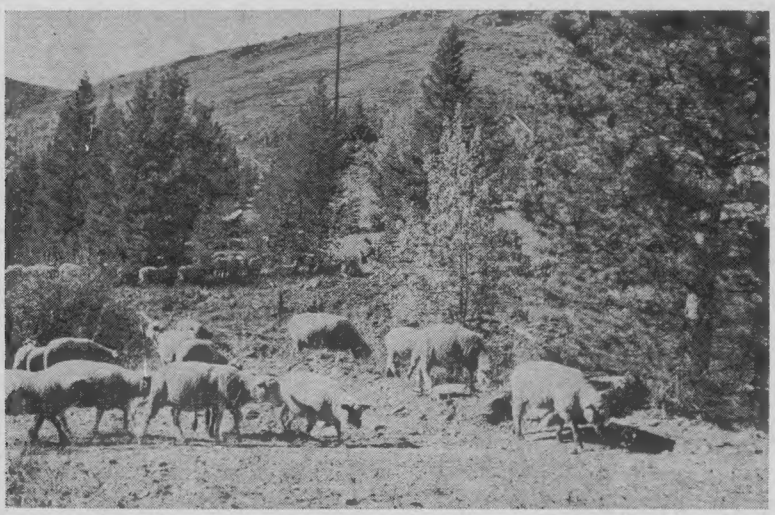


Fig. 1.—Land unsuitable for cultivation can be profitably utilized by sheep.

Courtesy of Alberta Department of Agriculture.

The introduction of sheep as part of the farm enterprise will necessarily mean the providing of proper facilities and equipment for handling them. The one feature presenting any serious financial problem is fencing. The flock not properly fenced is likely to prove a nuisance on the farm and may easily be more or less of a worry to one's neighbors. Fencing with woven wire is the most satisfactory in well settled mixed farming areas. While the initial investment in a suitable sheep fence may at first sight appear to be a rather serious question, at the same time when the cost of fencing is spread over the lifetime of a good fence, the situation is not so serious. In other words, the annual fencing charge against the flock

is not sufficient to seriously affect the financial showing. While it may be necessary to construct permanent fences in order to pasture certain fields, a considerable reduction in fencing charges may be effected by the use of movable or temporary fences whenever possible. The use of temporary fences has the additional advantage of making it possible to utilize areas not otherwise available for sheep.

One of the greatest drawbacks concerned with sheep raising is the losses sustained from ravages of dogs and coyotes. Proper fencing helps to control losses in this connection, but the fact remains that both dogs and coyotes are taking altogether too large a toll from sheep flocks in Alberta each year. It may be necessary in order to prevent these losses to provide corrals well fenced with woven wire in which the sheep are penned during the night.

The Provincial Department of Agriculture in 1951 assumed the responsibility for coyote control in settled areas by supplying coyote getters (cyanide guns) and specially prepared strychnine pellets to all municipalities who in turn make them available to sheep owners. The results have been quite satisfactory. In sparsely settled areas the Department supplies the poison known as "1080" to municipalities. The government supervises the use of this poison to make certain that the strict regulations are carried out.

The shelter required for sheep need not be expensive. Dry, well ventilated quarters that will protect the flock from winter storms are the main features to be kept in mind in providing

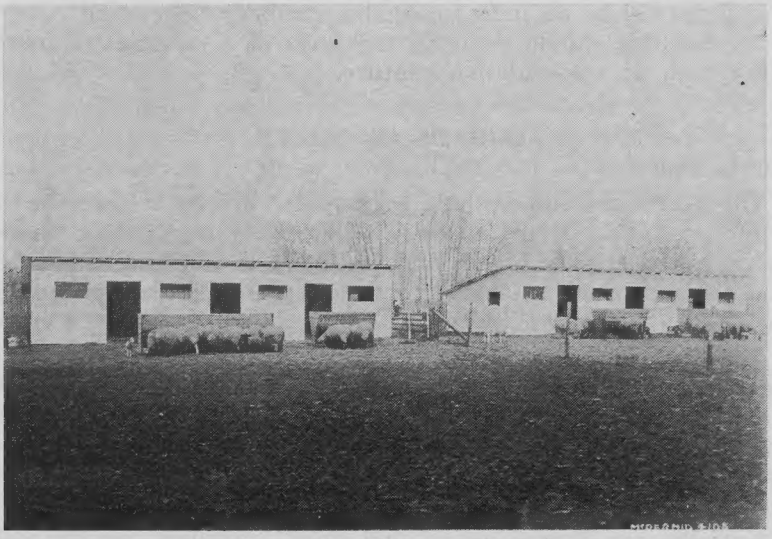


Fig. 2.—Sheep shelters need not be expensive.

shelters. Observations made in connection with the sheep flock on the University Farm over a period of several years have shown that provided sheep are kept on high dry ground they will make little or no use of shelter, except during a stormy period, even though the temperature may drop considerably below zero. It is true, of course, that when the policy is followed of having ewes drop lambs during the winter, provision of warmer quarters may be necessary.

While it is a fact that during most seasons of the year comparatively little attention need be given the flock, they do require close supervision at certain times, particularly during the lambing season, and to a more or less extent at weaning and breeding times. During the lambing season complications and difficulties of various kinds may develop which must receive prompt and proper attention.

When the farmer posseses a natural aptitude for sheep, the greatest success in sheep raising will be obtained. Kindness, cleanliness, regularity and the ability to sense the needs of the flock are essentials. Greatest success and maximum profits are secured only when everything is done to promote the thrift and comfort of the flock. The individual who has a natural fondness for other classes of livestock may feel reasonably assured that he will readily acquire the ability to care for and handle sheep.

In the case of the farmer who has had little or no experience with sheep and who has only a limited capital, the suggestion would be to start with a small flock and develop the business as finances, experience and general conditions will warrant. It may be expected that there will be an increase in the number of sheep on Alberta farms, but this should come in the form of a substantial growth rather than as a speculative venture.

BREEDS OF SHEEP

Suffolk Down

The Suffolk is one of the most popular breeds of sheep in the farm flocks of western Canada. It is a fairly large, thick bodied, fleshy, fairly low-set breed, and the meat is fine grained and of good quality. Suffolk lambs grow rapidly and can be fattened for market at a weight well within the range to make choice carcasses.

The wool covering is not extensive, the head and legs from knee and hock down are free from wool and the belly is inclined to be bare. The hair is black. The wool is only medium in length, fair in compactness and quality, with fleeces weighing between 6 and 8 lb., and grading medium to low medium staple. Black fibers in the wool constitute one of the major criticisms.

Suffolks are hardy, active and good travellers, which make

them well adapted for western Canadian conditions. They have been used extensively for crossbreeding in both farm and range flocks. Suffolk ewes make excellent mothers, being good milkers and produce a fairly large number of twins and triplets. Suffolk rams weigh between 225 and 275 lb., while many ewes reach 170 to 200 lb. when mature.

Fig. 3.—A group of typical Suffolk rams bred by the University of Alberta

Hampshire Down

This is one of the more popular breeds of sheep in Alberta. They are fairly large in size, rams attaining a weight of 250 to 300 lb., ewes reaching 175 lb. or more. They are fairly low-set, blocky and compact with good strength of bone. The fleece weight will average around 8 lb. and should grade medium to low medium staple. The wool covering extends well over the forehead and on to the cheeks. Greater extension of wool over the face is undesirable as it leads to snow blindness. The ear is quite large, black in color, and the same is true of the face and legs. While pink skins are desirable, blue skins are not uncommon. Some breeders believe that the black fibers in the wool are associated with the dark skin. Hampshire ewes are prolific and good milkers.

Hampshires and their crosses produce satisfactory market lambs as they mature and finish at a desirable weight and yield carcasses well developed in the regions of high priced cuts.

Fig. 4.—Hampshire ram, bred and owned by the University of Alberta. A show ram and sire of many prize winners.

Cheviot

The Cheviot is one of the most stylish and attractive breeds of sheep. Their alert appearance, white color, black nose and hoofs, body carriage, and general outline make this breed one that is admired. Mature rams weigh 175 to 200 lb. and ewes 125 to 160 pounds. The ewe produces a fleece of medium weight, averaging 5 to 8 lb., of fair quality, usually grading low medium staple.

Cheviots are noted for their length of life, prolificacy, hardiness and low mortality of lambs. Cheviot lambs are usually strong and vigorous at birth. They are not as rapid maturing as are most of the Down breeds.

North Country Cheviot

This breed is of recent origin. Between 1949 and 1952, 137 head were imported from Great Britain. Individuals of this breed have all the characteristics of the Cheviot except that they are bigger. A few flocks have been established in Alberta but the suitability of the breed has not been determined.

Oxford Down

The Oxford is the largest of the Down breeds, mature rams reaching a weight of 300 lb. and over, while ewes weigh around

Fig. 5.—A champion Cheviot ewe

Fig. 6.—A typical Oxford ram.

200 pounds. Best specimens of the breed are reasonably low-set and measure up fairly well from the standpoint of mutton type. On the other hand due to their greater weight together with a tendency to mature somewhat slowly, they do not produce as desirable a lamb either in weight or finish as some of the other Down breeds. Oxfords produce a fairly heavy fleece, from 3 to 4 in. in length, which usually grades low staple. Although at one time the breed was one of the most popular, very few flocks of this breed are being maintained.

Southdown

A few Southdown flocks are found in Alberta. It is the smallest of the Down breeds, mature rams weighing 160 to 200 lb., and the ewes 125 to 160 pounds. They are low-set, fine-boned with a short neck and short, broad compact body, well turned and heavily fleshed throughout, especially in regions of the higher priced cuts. From a carcass standpoint the Southdown is an ideal mutton breed, possessing the ideal proportions and meat of finest texture. Fleeces are fairly short in fiber, fine in quality, and average 5 to 8 lb. in weight. Ewes of this breed are not regarded as being as prolific or as good milkers as some of the larger breeds.

Southdown lambs are noted for their fattening qualities, becoming well finished at an early age and at weights between 60 and 70 pounds. Their superior mutton qualities have led to the use of

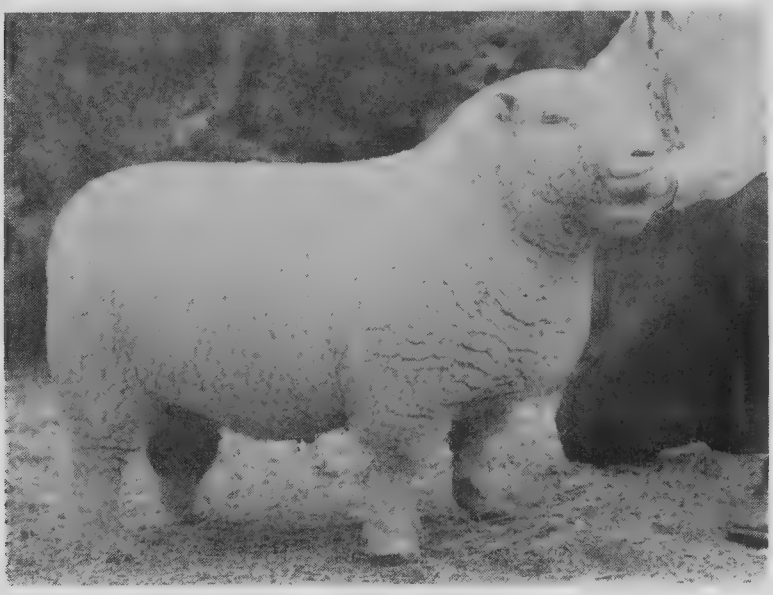


Fig. 7.—A champion Southdown ram.

Southdown rams for crossing with ewes of other breeds, where the aim is to produce early maturing lambs.

Shropshire

Sheep of this breed are medium in size, mature rams weighing 175 to 225 lb., and ewes 140 to 180 pounds. They are low-set with compact, smoothly turned symmetrical bodies. The wool usually measures from 3 to 3½ in. in length and grades medium to low medium staple. This breed is early maturing and produces a lamb carcass that is well fleshed in the region of the high priced cuts and of a desirable weight.

Fig. 8.—A champion Shropshire ewe.

The heavily wooled head especially around the eyes, is a handicap when Shropshires are exposed to winter storms. This breed makes the best showing where feed conditions are favorable, especially on pasture when it is not necessary to travel too great distances. They are not widely distributed in Alberta.

Leicester

This breed is popular in eastern Canada It is a breed of fair size, rams weighing from 200 to 275 lb., and ewes 175 lb. and over. They have a broad well fleshed back and loin, well turned body, with a fair leg of mutton. The wool extends to the hocks and knees and forward to the head, leaving the head and lower legs bare. The wool is long, measuring 7 to 8 inches, and is fairly coarse, usually

grading low staple to common and braid. The fleece averages 8 to 10 lb. in weight. It is an open fleece unsuitable to animals that are liable to exposure or extreme cold. Leicesters have been found exceptionally good for the production of crossbreds.

Rambouillet

The hardiness, banding instinct and grazing ability of the Rambouillet make them particularly well adapted for range conditions. They are the predominant breed in the range flocks of western Canada. They produce heavy fleeces that are compact and of fine quality, from 2 1/3 to 3 in. in length, with good crimp and lustre, weighing 10 lb. or more. Rambouillets are lacking in mutton conformation and quality which has led to the use of mutton rams in range flocks for the production of crossbred lambs.

The Rambouillet is only moderate in size, rams weighing approximately 225 lb. at maturity and the ewes 150 to 160 pounds. Rams usually have large spirally turned horns, and the females are hornless.

Fig. 9.—Champion Rambouillet ram.

Corriedale

The Corriedale breed was developed mainly for range conditions. They are superior to the Rambouillet in prolificacy and in mutton conformation. Corriedales produce a good fleece that grades half-blood. While not as hardy as the Rambouillet under range conditions, the Corriedale has been used for crossing purposes in farm flocks.

Romnelet

The Romnelet was developed by the Range Experiment Station at Manyberries by crossing animals of the Romney breed with the Rambouillet. Through many generations of strict selection a strain of sheep has been secured which is to become recognized as a separate breed.

Romnelets are good in mutton conformation and produce heavy fleeces of fairly fine quality. They possess the banding instinct, are hardy and a more suitable breed for the range and semi-range areas than for farm flocks.

Fig. 10.—A typical Romnelet ewe.

Karakul

The Karakul breed originated in Asia. They are considered fur-bearing animals, the pelts of the lambs being called Karakul, Persian, Astrakhan and other names. The pelts have the highest value when the lambs are one to three days of age. According to commercial furriers, Canadian and American pelts are lower in quality than those produced in Asia. The Karakul is of little value for mutton.

SELECTION OF THE RAM

Flock improvement is secured mainly through the use of superior rams because each ram transmits his inheritance to many more offspring than does any one ewe.

Improvement in rate and economy of gain should be the major consideration in the selection of a ram if increased profits are to be secured. Purebred rams are superior to grade rams because purebreds transmit their good qualities with greater certainty than do grades.

In the selection of a ram the points to consider are:

1. **Performance:** The ram should be of good size in relation to age, and possess the desired conformation. Some allowance should be made for ram lambs born and raised as twins.

2. **Breed type:** The selection of a purebred ram possessing the ideal color of hair, shape of head, wool covering, etc., is necessary for the improvement of a purebred flock. Such breed type characteristics can be disregarded in selecting a ram for a grade flock because the commercial value of their offspring is more dependent on conformation and market finish.

3. **Masculinity:** As shown by vigor and boldness as indicated by full bright eyes, large nostrils, broad head, short thick neck, normal testicles, and well developed forequarters.

4. **Mutton conformation and quality:** Rams of the mutton breeds should be low-set, with sufficient bone, and a broad, well-turned, thickly and firmly fleshed body from shoulder to dock. The hind legs should be well fleshed, with a deep, full twist and flank.

The ram should not be heavily fitted since a ram carrying too much flesh is frequently a slow breeder and sometimes fails to "settle" ewes until he becomes normal in flesh and vitality.

5. **Age:** Immature rams are not as efficient for breeding purposes as mature rams. Inability to serve ewes or disregard for ewes in season often occurs when immature rams are used. It is possible, however, to select a suitable ram lamb of the early maturing breeds, dropped in January or February, with sufficient size and vitality to successfully serve a small flock of ewes. Since the future development of ram lambs cannot be predicted with accuracy, mature rams should be given a preference in selection.

6. **Disqualifications:** Rams should not be used for breeding if they have the following heritable defects: bulldog jaw, parrot mouth, only one testicle (ridgling), or fleeces containing black fibers.

ASSISTANCE TO SHEEP OWNERS

Assistance in selecting and buying suitable rams is provided by both the Federal and Provincial Departments of Agriculture.

When requested by breeders of purebred sheep, the Canada Department of Agriculture will classify rams as suitable for use in

purebred or in commercial flocks. They will also purchase suitable rams for individual breeders and for organized ram clubs who make the necessary application and deposit. Further details can be secured by writing to the Livestock Division, Production and Marketing Branch, Canada Department of Agriculture, Edmonton or Calgary.

The Alberta Department of Agriculture will purchase rams for private breeders on request. Financial assistance is given owners of grade flocks in the form of a bonus on the purchase of suitable purebred rams to head their flocks. Details of and application forms for this assistance can be secured by writing to the Livestock Commissioner, Alberta Department of Agriculture, Edmonton.

SELECTION OF BREEDING EWES

The careful selection of the ewe flock must be combined with careful selection of the ram if most rapid improvement in type and performance of the flock is to be secured.

While it is advisable to purchase the best foundation ewes that are procurable, the intelligent selection of ewe lambs to be retained in the flock is of great importance. In order to maintain the size of a flock, about half of the ewe lambs must be retained each year to replace ewes culled for old age or poor performance or that have died.

In selecting ewe lambs for breeding:

1. Keep those that have grown most rapidly, making allowances for lambs born and reared as twins.

Fig. 11.—A breeding ewe should show fair size and conform to the low-set thick mutton type.

2. Select those with a good mutton conformation. The lambs should be broad, low-set, and carry more flesh than average.

3. Save those lambs with fleeces that are compact and with good fiber length. Avoid lambs with black fiber.

4. Cull lambs with weak pasterns, crooked legs, or bulldog or parrot jaws.

5. In purebred flocks breed type must also be considered.

When selecting older ewes for starting or adding to a flock the same factors should be considered as for ewe lambs. Old ewes with broken mouths or damaged udders should never be selected.

CATCHING AND HANDLING SHEEP

The use of correct methods of catching and handling sheep is important, not only to prevent waste of energy, and time, but also to prevent injury and discomfort to the animals.

When animals are corralled in a small pen, catching can be most effectively done by grasping the flank, as less struggling on the part of the animal is experienced. In the field the use of a shepherd's crook is recommended. There is a tendency on the part of inexperienced sheepmen to grasp the animal by the wool. This is a careless practice, often causing serious bruises, and should be discouraged.

A sheep is most easily led by holding the neck of the animal with

Fig. 12.—Sheep can be most effectively caught by grasping the flank.

Fig. 13.—The proper way to grasp a sheep to set it on its rump.

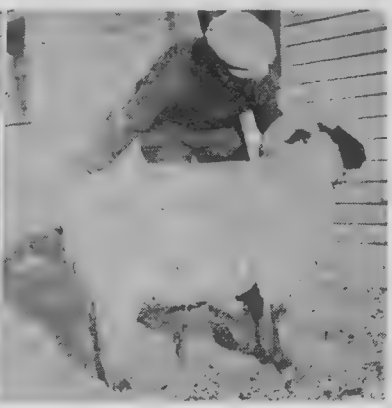


Fig. 14.—The simplest way to guide sheep.

one hand and pressing the end of the dock with the other. Pulling by the head or neck causes the animal to struggle and resist being led.

Sheep are placed on their rumps for shearing, feet trimming, udder inspection or other purposes. Many methods can be used to place ewes on their rumps. For ewes too heavy to lift a simple way is to place the left arm around the front of the animal, and pass the right hand under the body to grasp the hind leg on the far

Fig. 15.—Sheep cannot be moved easily when grasped in this manner.

side as shown in Fig. 13. By pulling steadily on the leg and raising the forepart of the body the animal is most easily brought to the desired position.

A well trained sheep dog can be used to advantage in driving and corralling sheep, especially in large flocks. On the other hand, a poorly trained dog may cause considerable worry to the flock and trouble to the shepherd.

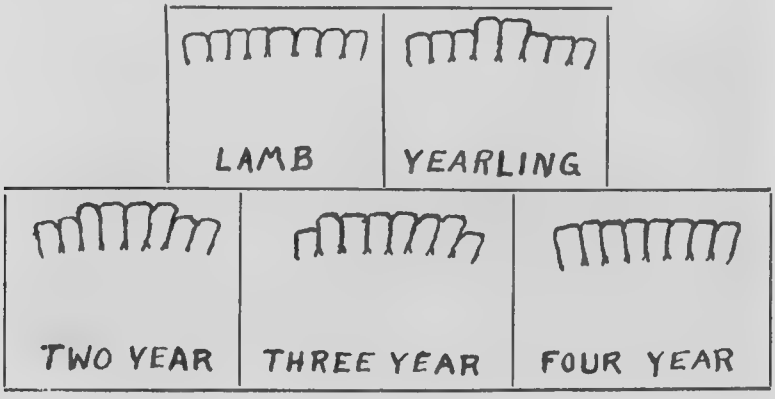
ESTIMATING AGE BY THE TEETH

The age of sheep up to 4 years can be easily determined by examining the teeth. The mouths of sheep are equipped with a full set of 24 molar teeth on both upper and lower jaws, for the mastication and grinding of food. In addition four pair (8) of incisor teeth are provided along the front of the lower jaw, which together with the lips and upper gum, enable the sheep to gather and cut off each mouthful of grass. The incisor teeth have been called "nippers," which in itself describes their use. It is the incisor teeth that are examined to determine age.

At about 3 weeks of age lambs usually possess a full set of 8 incisor "milk teeth." These are smaller and narrower than the permanent incisors. At the age of 12 or 15 months the center pair of "milk teeth" are lost and replaced by two permanent incisors which can be readily determined by their size. Permanent incisors are longer and broader than the "milk teeth."

Each succeeding year an additional pair of "milk teeth" are replaced by permanent ones in regular order, so that when sheep are 4 years of age a full set of 8 permanent incisors will be found.

The following illustration indicates how the teeth appear at different ages:



After 4 years of age there is a tendency for the teeth either to wear down until they become like stumps, or loosen and fall out. It is therefore impossible to tell exactly the age of sheep after they are 4 years of age. If one or more incisors are missing in mature animals, they are called "broken mouthed," or if all incisors are missing the term "gummer" is applied.

Sheep that have been well cared for and properly fed will often maintain a full mouth until they are 7, 8 or even 9 years of age, while range sheep or poorly cared for sheep that have suffered many periods of food shortage and exposure to severe weather begin to lose their teeth at 5 or 6 years of age. As soon as ewes become "broken mouthed" their usefulness is much impaired.

FEEDING AND MANAGEMENT OF THE FLOCK DURING THE BREEDING SEASON

Feeding

The breeding season for sheep is normally in the fall and early winter months. It occurs during a season when ewes may be in a thin and unthrifty condition due to scant pastures and following a more or less strenuous suckling period. When ewes are in such a condition at breeding time there is a tendency toward the production of a small lamb crop and a lengthening of the breeding season due to some ewes failing to conceive at one or more services. Experience and experiments have proven that such results can be overcome by the feeding of suitable rations during the breeding season.

The term "flushing" has been given to the feeding practice which has for its purpose an increase in the thrift of the ewes and as a result a more satisfactory lamb crop. The necessity for flushing and the response secured depends upon the condition of the ewe and also on the condition of the pasture and feeds fed prior to the breeding season. It is in the case of the thinner, more unthrifty ewes that the greatest effects of flushing will be secured.

Provision of succulent pasture just prior to and during the breeding season is regarded as the most suitable and economical method of flushing. This, however, necessitates early breeding under Alberta conditions, and can therefore only be recommended for farmers with equipment to handle lambs under January, February and March conditions.

Rape pasture has for several years given excellent results at the University of Alberta during the breeding season of purebred ewes. This is indicated by the following figures. Grouping all ewes of 5 different breeds during a 4-year period the following number of lambs were dropped:

2	year	olds	1.71	lambs	per ewe
3	year	olds	1.90	"	" "
4	year	olds	2.04	"	" "
5	year	olds	1.93	"	" "
6	year	olds	1.78	"	" "

Although not all of the lambs represented by the above figures were raised, it does indicate the benefit which can be secured by the use of a succulent pasture during the breeding season.

No data are available on the comparative merits of the various pasture crops for flushing, but it is logical to assume that there would be very little difference between the various pastures provided they furnish an abundance of fresh succulent food throughout the breeding period.

On most farms, however, the breeding season is usually in November and December, when pastures are not available and the flock is under winter feeding conditions. Flushing may be satisfactorily accomplished under these conditions by the use of grain together with good quality hay. The feeds should be nutritious and provide the necessary constituents for reproduction and flesh building. Carbonaceous rations are not as suitable as those that furnish a fair amount of protein. Thus, the addition of alfalfa and sweet clover hays, bran or linseed meal can be recommended.

Large lamb crops have some disadvantages as well as advantages. Twins are not usually as heavy nor as thrifty at birth as are single lambs. Twins grow more slowly than singles because they have to share the milk their mothers produce. The mortality is slightly greater among twins than singles. Yet in spite of these disadvantages large lamb crops are desirable because if the ewes are given proper feed and care during pregnancy and lactation more lambs will survive to market age and a greater income will be realized. The extra feed required during the breeding season is a very worthwhile investment.

Management

The aim of the sheep owner should be to have his ewes successfully bred within a 3 or 4-week period so that the lambing season will not be prolonged. During the breeding season it is advisable to check the performance of the ram in order to make certain that the ewes are actually being bred. A little attention at this time, and more especially during the first few days, may avoid considerable disappointment later.

At the beginning of the breeding season the ram should be in a thrifty condition, not carrying a surplus of flesh. Heavy service is a considerable strain on the ram and unless fed liberally during this season he may lose weight and vitality.

There are various methods of managing the ram during the breeding season. One of the most common practices, especially in grade flocks, is to allow the ram to run continuously with the ewes. This system works out satisfactorily in small flocks, as the limit for one mature ram would be between 35 and 50 ewes. Less time and attention are necessary when this method is followed.

In larger flocks, or when it is desirable to conserve the energy of the ram, the ram should be removed from the ewes during the daytime and only allowed to run with the ewes at night when they are corralled. During the daytime the ram should be placed in a separate pen and fed sufficient grain to maintain a fair condition of flesh. Mature rams can handle from 50 to 75 ewes when so managed.

Under certain conditions it may be an advantage to practise what is known as "hand coupling." Under this system the ram is not allowed to run with the flock, but ewes in season are brought to him for service. Usually a "teaser" is used. A "teaser" is an active ram, usually not being used for service, upon which an apron is tied to prevent copulation. He is allowed to run with the ewes for a short time each day to detect those that are in season. By use of this system a mature ram is capable of serving 75 to 100 ewes.

Well developed ram lambs may be used. Obviously it is not to be expected that they will handle as large a flock as a mature ram. Given reasonably good care, however, they should be able to serve from 25 to 30 ewes.

Keep Breeding Records

In order to keep a check on the ewes as they are bred and become pregnant, lampblack or ochre should be painted upon the breast of the ram before being placed with the ewes. In this way records can be kept of the individual ewes as they become marked. At the end of a 16 or 18-day period the breast of the ram should be painted a different color. By following this practice ewes that are served again in their second "heat" period can be noted and recorded. When the dates on which the ewes are due to lamb are known, better care can be given them at that time.

The painting of the breast of the ram has an additional advantage in that it is possible to determine how successful a breeder he is. If a large number of the ewes continue to be bred at each successive period the owner knows that the ram is either infertile or for some other reason is not settling the ewes. If certain ewes continue to be bred at each successive period, then one may have reason to suspect that something is wrong with the ewes; they may be infertile, due to abnormal reproductive organs or to obstructions, such as too long a dock or tags that make mating impossible.

WINTER FEEDING AND MANAGEMENT

Feeding

Numerous experiments conducted at the University of Alberta have shown, beyond a doubt, that the fleece weight of the ewes and the strength and size of lambs at birth are greatly influenced by the ration fed during pregnancy. Since practically all the income from sheep is derived from wool and lambs, the importance of winter feeding is obvious.

Certain feeds may be suitable from the standpoint of maintaining the flock in a satisfactory condition of flesh, or for fattening, but unsuitable for reproduction. The birth of soft, flabby, undersized, weak, goitred and dead lambs takes heavy tolls each year in many flocks. This can be traced, in many cases to improper feeding of ewes during their pregnancy period. Unless the ewes receive the food nutrients from which lambs and wool can be produced, big strong lambs, and normal wool growth cannot be secured.

Considerable experimental work has been conducted at the University of Alberta with a view to securing definite information with respect to the suitability of the common Alberta roughages, when fed both singly and in combination to pregnant ewes. These trials showed that certain hays were more suitable than others. Later work was conducted to find out what supplements could be fed in conjunction with the less suitable hays to secure heavier, stronger and better developed lambs.

The following discussion is based on the results of these trials.

ROUGHAGES

Legume hays

These hays are richer in protein and minerals, making them more suitable and economical than grass or cereal hays for sheep feeding.

Alfalfa hay is probably the only single roughage that contains sufficient of all the required nutrients to carry the ewes successfully through the winter. During three winter trials the ewes were fed an average of 3.9 lb. of alfalfa daily. They were maintained in a better condition of flesh, gave birth to heavier lambs, and produced heavier fleeces than was the case when ewes were fed any of the other single hay rations. Alfalfa hay is especially valuable as a roughage during the suckling period prior to the pasture season. When alfalfa has been substituted for part of a non-leguminous ration it has greatly improved the performance of the ewes. Since it has been demonstrated that alfalfa can be successfully grown in

most districts in Alberta, sheep owners should find it to their advantage to grow and feed his valuable crop.

Sweet clover hay ranks next to alfalfa as a roughage for wintering ewes. Although its protein content will compare favorably with alfalfa, sweet clover is not as palatable as alfalfa hay. On account of its coarser nature and high moisture content it is more difficult to obtain well cured hay without considerable leaf loss. For this reason, much of the sweet clover available for sheep feeding lacks the quality found in alfalfa.

Red clover hay, while not as high in protein as alfalfa, is an excellent hay for feeding sheep. It is especially adapted to the grey-wooded and black soil areas where moisture is plentiful.

Grass hays

When cut at the proper stage of maturity most grass hays are palatable and fairly nutritious. Grass crops cut at a later stage contain less protein, are less palatable and less suitable for sheep.

Brome and red top hays cut after heading but before blooming make hay of good quality. While brome is adapted to a wide range of soil moisture conditions, red top is recommended for acid soils that are subject to flooding.

Timothy, quack grass and crested wheat must be cut when just beginning to head to produce hay of fair quality. As the grasses mature their protein content decreases rapidly and the hays become less palatable. Timothy hay that has been cut when fairly mature should not be fed to sheep because the dry shattering heads work their way through the fleece, irritating the skin and lowering the selling value of the fleece.

Native hay varies widely in composition. The best and most nutritious native hay consists wholly of the finer grasses, cut green and well cured. The lower grades contain coarse slough grasses that are neither palatable nor nutritious. Sometimes the hay contains sufficient spear grass to make it harmful for sheep feeding.

Reed canary and slough grass. As a general rule these hays are coarse, unpalatable and low in feeding value. Sheep usually consume insufficient of these hays to meet their maintenance requirement and it is necessary to supplement the ration with liberal quantities of grain.

Cereal Hays

Cereal plants are deficient in minerals and the protein content and palatability decrease rapidly as they mature.

Oat hay (oat greenfeed) should be cut when still green and when

the kernels are in the milk or early dough stage to secure hay of fair quality and feeding value.

Oat hay, when fed alone and without an iodine supplement, has proven to be a very poor roughage for pregnant ewes. Soft, flabby, weak, goitred, partially hairless, and dead lambs were produced. Some years only a few lambs reached market age, while in other years 80 per cent of those born were marketed. The oat plant is known to be deficient in certain minerals, especially iodine and calcium. This fact explains why oat hay, when fed alone, has proven unsatisfactory for reproduction even though the ewes are usually maintained in a fair condition of flesh.

Good lamb crops have been secured when iodized salt and a calcium supplement have been added to an oat hay ration. Keeping in mind that variety is desirable in any ration, better results will be obtained when other hays or silages are fed with oat hay.

Barley hay is similar to oat hay in composition and feeding value. The presence of awns makes barley hay less desirable and if cut too mature it may prove harmful. This can be avoided by seeding awnless barley.

Oat straw lacks palatability and is low in nutritive value. At the University ewes fed on oat straw alone lost so much flesh, and became so weak, that it was necessary to supplement it with a liberal supply of other feeds in order to keep the ewes alive and put them into a reasonably thrifty condition for lambing.

When fed with alfalfa, or some other nutritious roughage, or when suitable grain mixtures are fed, oat straw may be fed in small amounts. With the feeding of oat straw the same difficulty was experienced as when oat hay was fed—there was a tendency toward flabby, weak, goitrous and dead lambs. This points to the necessity of properly supplementing rations containing oat straw with potassium iodide.

Silages

Silages made from legume, grass or cereal crops of good quality, are excellent for the feeding of pregnant ewes. They usually contain relatively higher amounts of protein and minerals than hays made from similar crops. However, sheep should not be forced to subsist on silage alone as they usually cannot consume sufficient quantities for maintenance and reproduction. Best results are obtained when the silage is fed with hay or with enough grain to maintain the ewes in fair flesh.

Legume or legume-grass silages are higher in protein and minerals than grass or cereal silages, and require only the addition

of a carbonaceous hay and/or a small grain allowance to provide a balanced ration.

Oat silage and barley silage are deficient in protein and minerals. While these silages may help to maintain the ewes in good flesh, they are unsuitable for reproduction. Additional protein and minerals should be provided in the form of a legume hay or protein and mineral supplements to secure a satisfactory lamb crop.

In experiments conducted at the University of Alberta it was found that when ewes were fed 4 to 5 lb. oat silage daily plus a full feed of oat hay, very poor lamb crops were produced even though the ewes were maintained in fair flesh. Better results were secured when a full feed of grass hay replaced the oat hay. Still better results were secured when a full feed of alfalfa was fed with the 4 to 5 lb. of oat silage.

Roots

Turnips and mangels are relished by the flock during the winter and if one takes the trouble to grow these it will be found that they add succulence and variety to the ration.

The Use of Grain Mixtures in Winter Rations

Whether or not grain need be fed depends upon whether the roughage ration maintains the ewes in a thrifty condition. When the roughage is of good quality the ewes will eat more of it and consequently be maintained in better flesh than when a hay of poorer quality is fed. During the winter the breeding ewes should be examined periodically for condition of flesh to determine if grain should be fed or their grain allowance increased or decreased.

Experiments have shown that grain feeding during the latter half of the pregnancy period gives almost as good results as feeding grain during the entire pregnancy period.

After lambing, grain feeding is advisable to meet the increased needs of the ewes for milk production. Oats is possibly the best single grain that can be fed during this period. The addition of small amounts of bran or linseed meal is advisable when grass or cereal hays are being fed. Ewes suckling lambs require from ¾ to 1 lb. of grain daily until they are turned out on pasture.

Salt and Minerals

Sheep should have access to salt at all times. The feeding of iodized salt to prevent the birth of soft, flabby and goitrous lambs is strongly recommended for all districts. Either iodized block salt can be used or the flock owner can mix 3 oz. "stabilized" potassium iodide with 100 lb. salt.

The need for cobalt has been demonstrated for sheep on diets

restricted to grass hays and grains. Since cobalt is relatively cheap and since salt companies are marketing a cobaltized-iodized salt mixture, the feeding of cobalt can be recommended as insurance against the possible development of cobalt deficiency symptoms, even though the cobalt-deficient areas in Alberta are not yet well defined. Many commercial mineral supplements contain cobalt.

When ewes are being fed grass or cereal hays a combination calcium and phosphorus supplement should be fed. Bone meal, dicalcium phosphate or defluorinated rock phosphate can be used. A common practice is to mix equal parts of mineral supplement and the cobaltized-iodized salt and to allow the ewes access to the mixture at all times.

MANAGEMENT

During the winter the flock should have access to a suitable shelter. An expensive building is not necessary. Single ply board or straw sheds will provide the essential requirements. The main features to keep in mind are that the building should be of sufficient size to avoid crowding, located on high dry ground, and kept clean, well bedded and properly ventilated. It should also be well lighted, as sheep do not thrive as well when kept in dark quarters. From 8 to 12 square feet of ground space should be provided for each ewe.

Exercise during the winter months is very important as it promotes thriftiness in ewes and results in a stronger lamb crop. Sufficient exercise may be secured by providing yards that are protected from prevailing winds. Feeding racks can be placed some

Fig. 16.—Showing one trimmed and one untrimmed hoof.

distance away from their shelter to induce the ewes to take a greater amount of exercise.

There is danger of abortions during the winter through injuries caused in various ways. Principal among these is the jamming of ewes in their effort to get through a narrow door or between obstacles that are close together. This may be overcome by providing doors of good width and by careful handling of the flock.

Before the flock is turned out on grass it is advisable to give some attention to the feet. Deformed feet, crooked legs and broken-down pasterns are often caused by an overgrowth of hoof. The hoof should be trimmed down with a hoof knife, hoof clipper or ordinary knife so that the animal can stand and walk normally.

Attention should also be given to prevent fleeces from becoming filled with chaff and thereby decreasing their value. For this reason the flock should not be allowed access to straw stacks or be fed from improperly constructed feed racks. Combination racks, which provide for both grain and roughage feeding, when closely boarded to within 5 or 6 inches of the bottom, prevent chaff from falling into the fleeces. Figure 17 shows one type of such feed rack. From 18 to 24 inches of rack space should be provided for each ewe and a 10-foot rack built for feeding on both sides would therefore accommodate from 10 to 12 ewes. Hay may be fed on the ground, but under this system considerably more feed is wasted.

Water should be provided daily even when snow is available, to insure that their need for water is supplied.

Fig. 17.—Properly constructed feed racks mean a saving in feed as well as maintaining a clean fleece.

CARE OF EWES AND LAMBS DURING THE LAMBING SEASON

If best results are to be obtained it is essential that considerable attention and care be given to the flock during the lambing period. It is at this time that more losses, ailments and difficulties occur than during any other season. Since the majority of lambs in Alberta are born in April and May, the lambing season takes place while the ewes are still under winter feeding conditions, although the temperature is usually high enough during most of the time to make close confinement in the barn unnecessary. Some farmers with small flocks have been successful in allowing the ewes to lamb around straw stacks or in the barnyard. There is danger, however, especially with larger flocks, of many avoidable losses occurring by such practice, since close observation and individual attention cannot be given the flock.

Preparations for the lambing season

When the lambing season approaches and particularly when no record has been kept of the date each ewe was bred, the flock should be watched carefully each day and those ewes that show signs of lambing within a few days should be separated from the main flock and given special attention and feed. The enlarging of the udder and vulva can usually be noted a few days before the ewe is to lamb. As the time for lambing approaches the ewe becomes restless, may refuse to eat, and usually separates herself from the flock.

All loose tags and dung locks around the hindquarters and udder should be removed. This will not only make it easier for the lambs to suckle but will prevent losses due to the ingestion of wool and dung.

Many successful sheep breeders provide individual pens for the ewes and their lambs for a few days following birth. These pens are made with movable, hinged panels so arranged to make a series of pens within the winter shelter. The isolation of ewes with their lamb(s) for a few days after birth prevents ewes and lambs from straying apart and ewes disowning their lambs. Weak lambs can be easily assisted in suckling.

Lambing problems

There are various difficulties which may arise at lambing time for which assistance or attention on the part of the attendant is needed to prevent serious losses.

Ewes when laboring sometimes lie in a position so near the wall that it is impossible to expel the lamb. Careful observation is

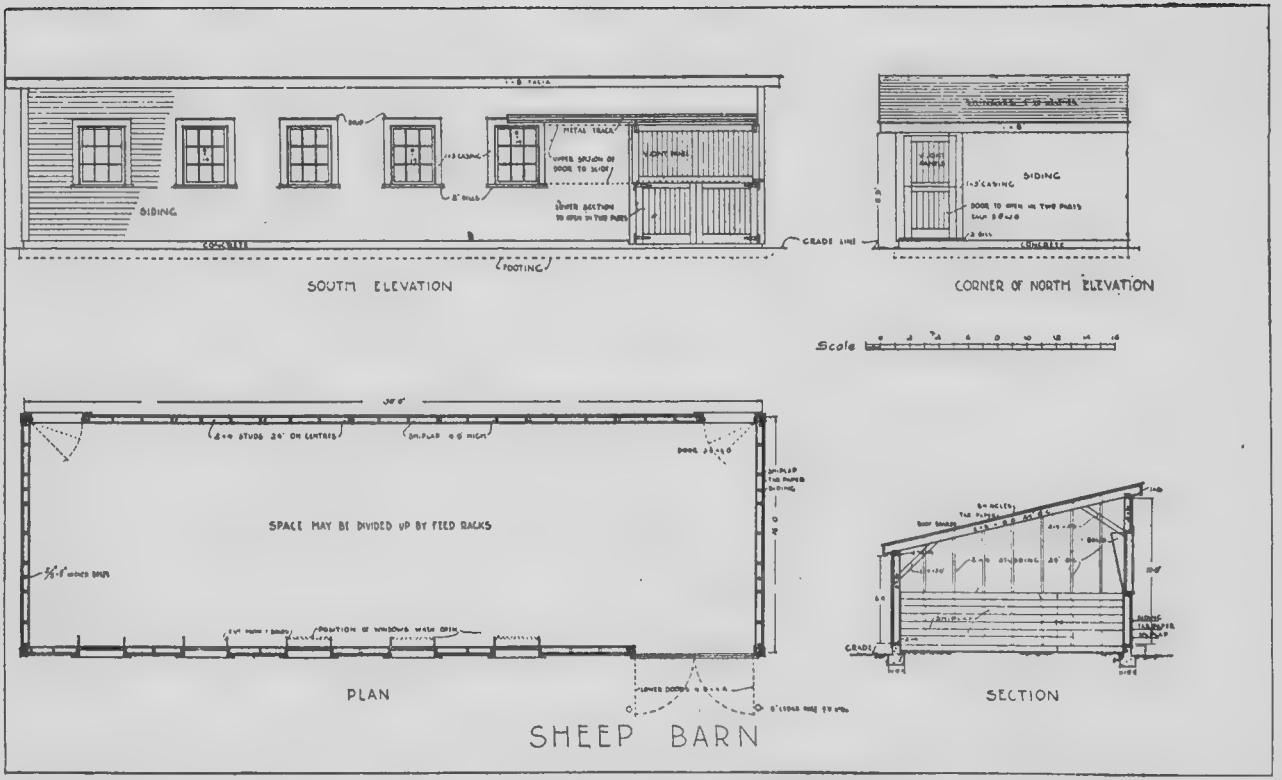


Fig. 18.—A cheap, shed-roof frame building, 16 x 50 feet, without any interior fittings, but suitable in every way for keeping sheep. A flock of about eighty sheep can be wintered comfortably in it.

necessary to prevent this occurrence, as too long a delay will cause the death of the lamb in the uterus.

Lambs are born enclosed in a covering or sac which if not ruptured during birth must be removed from the nostrils immediately after birth so that normal breathing can be established. In most cases either the struggling of the lamb or action on the part of the ewe breaks the sac, but in a few cases the ewe fails to do so, due to the fact that she is either too weak, is busy expelling the second lamb, or gives attention to only one of her lambs. Breathing must be established within a few minutes if the lamb is to survive.

Lambs born during cold weather often become chilled to such an extent that death may result unless proper treatment is given. Such lambs are often immersed in warm water and rubbed dry with a woolen cloth to stimulate the circulation of blood. A chilled lamb can be warmed by placing it in a box near the stove, or providing the box with a hot water jug wrapped in a blanket. In severe cases the administration of a few drops of whiskey in a little water, or a diluted solution of aromatic spirits of ammonia will prove beneficial.

Lambs should suckle within an hour or two after birth. Lambs that are strong at birth usually suckle without any assistance, while weak lambs often require some help. When the ewes and their newborn lambs are placed in their individual pens it is an excellent practice to make sure that there is nothing wrong with the udder as well as making certain the lamb will suckle.

Occasionally apparently lifeless lambs are dropped. Immediate attention must be given these lambs to revive them. The mucus in the nostrils and mouth should first be removed. Vigorously massaging the body, especially just back of the forelegs, gently slapping the ribs and blowing in the nostrils, will usually stimulate life processes. A tablespoonful of corn syrup or molasses every few hours will supply strength to a weak lamb.

Not infrequently the ewe has difficulty giving birth to her lambs in which case mechanical assistance is required. Excessive size of lamb, abnormal position of the lamb, or twin lambs emerging at the same time are among the most common causes of difficult lambing.

In giving assistance, the lamb is turned into normal position and the forelegs pulled slowly as the ewe strains until the lamb is expelled. Patience, gentleness and sanitation must be observed to save most lambs and ewes requiring assistance.

Occasionally ewes will expel their "lamb bed" (eversion of the uterus) or develop an inflammation of the udder (mastitis) that, if not given immediate treatment, may result in the loss of the

ewes and their lambs. The treatments for these ailments are fully discussed in the section on diseases.

Orphan lambs

Ewes that have lost their lambs at birth should be induced to adopt an orphan lamb or a twin lamb dropped by another ewe. By so doing, the bottle feeding of orphan lambs becomes unnecessary and, in the case of twin lambs, the rate of gain is increased.

Many methods have been tried to induce ewes to adopt lambs. One of the earliest methods was to skin the ewe's dead lamb and tie the pelt upon the one to be adopted. This method is still practiced. If a ewe loses her lamb at birth she may be encouraged to adopt another lamb by smearing it with some of her "cleanings." The ewe and lamb to be adopted should be isolated in a small pen until adoption is completed. It may be necessary to hold the ewe to allow the lamb to suckle for the first few days.

Feeding cow's milk to orphan lambs is sometimes necessary when milking ewes are not available to adopt them. For this purpose a wide-necked bottle with a nursing nipple is used. In bottle feeding there are a few things to be kept in mind, especially in the early stages—small amounts at frequent intervals, milk of blood temperature and cleanliness of nursing bottle and nipple.

METHODS OF IDENTIFICATION

Identification is essential for registration in purebred flocks and for selection and culling in both purebred and commercial flocks. There are several methods of marking. The placing of metal tags in the ears is the most common and possibly the most satisfactory method. Ear notching may lend itself to use in grade flocks or where it is desirable to identify lambs from different sires and for identification of ownership in the case of mixed flocks.

All purebred breeders must either tattoo or use ear tags. The breeder must apply to the Canadian National Live Stock Records for and be allotted letters for his exclusive use with which to identify sheep lambed his property. If identifying by tattoo marking, the letters allotted the breeder must be placed in the ear, left or right, designated by the Canadian National Live Stock Records. In addition to the identification letters, there must also be tattooed in the other ear the flock number of the animal, followed by a designating year letter to signify the year of birth. The letter "M" signifies that the animal was born in 1957, the letter "N" that the year of birth was 1958, the letter "P" 1959, "R" 1960, and so on.

If the system of ear tagging is used the purebred breeder must order the ear tags from the Canadian National Live Stock Records, Ottawa. The tags will show the breeder's letters allotted to him

and a flock number followed by the designated year letter. This identification tag must be placed in the right ear. Ear tags can be placed in the ear at any time after birth without causing the ear to droop, providing the tag is placed fairly close to the head. A suitable time is before the ewe and lambs are taken from their individual pens.

DOCKING

Practically every sheep owner realizes the importance of docking. The operation is simple, requires little time, and there is very little danger of loss if properly done.

When the tail is not removed manure adheres to the wool on the tail and around the anus, making a good place for invasion of maggots. Undocked lambs do not present as trim and attractive appearance as do docked lambs, and for this reason the former are discriminated against when offered for sale. The effect of leaving ewe lambs undocked may be even more serious than in the case of market lambs, as the presence of the tail with its accumulated filth may interfere during the breeding season and prevent normal service.

Docking should be done when the lambs are between 5 and 14 days old. Lambs should not be castrated the same day, as the shock suffered from both operations may be too severe. The younger the lambs are docked the less severe is the effect, although it is not advisable to dock lambs before strength and thriftiness have been established.

The tail should be removed at the second joint from the body. There are several methods of docking lambs. The tails can be removed by using searing irons, by cutting with a sharp knife, by the use of a "Burdizzo"-type castrator or by use of rubber rings.

There are two principal kinds of searing irons, one shaped like a chisel, the other a hinged instrument, that sears through from both sides. The irons are heated to a cherry red. The operation should be quickly done to prevent the heat from burning the anus or vulva. When a docking chisel iron is used the lamb can be held as shown in picture (Fig. 19 lower). When the hinged searing iron is used the tail is usually pulled through a hole in a board one inch in thickness, removing tail flush with board.

Docking with a sharp knife is more quickly accomplished and less equipment is required. The sharper the knife the more easily the operation is accomplished. The lamb can be held as shown (Fig. 19 top), and the tail removed by cutting through from the top or from underneath. One man can perform the operation, while when using searing irons two men are required. Blood flows freely from the freshly cut dock. Usually the flow of blood

Fig. 19.—Docking by knife or searing iron is easily done.

is rapid for about ten seconds. Within one minute the flow generally ceases. However, in a few cases the rapid flow of blood may continue, and in such cases it is necessary to tie a string around the dock to save the life of the lamb. When this is done the string should not be allowed to remain on longer than a few minutes. To prevent infection it is desirable to apply a disinfectant to the dock after the operation and thus insure rapid healing.

When lambs are docked with a "Burdizzo"-type castrator, the tail is cut off inside the closed jaws. The instrument should remain in a clamped position for several seconds before releasing. There is usually less blood lost than when a sharp knife is used.

The rubber ring method of docking is done with a special type of ring and an instrument for expanding and applying the ring to the tail. The constricting action of the rubber ring stops blood circulation, causing the tail to atrophy and drop off in from 3 to 5 weeks. This method should only be used on lambs 7-9 days old, as severe pain and discomfort is experienced when the rubber rings are used on older lambs.

CASTRATION

All male lambs, not intended for breeding purposes, should be castrated. Uncastrated lambs, after reaching 50 or 60 lb., continually worry the ewe flock. This results in slower gains being made by not only the lambs, but the ewe flock as well. If ram lambs are allowed to remain with ewes during the latter part of August and September, there is danger of "catch" breeding, which interferes with the planned breeding program and makes the handling of the flock in early spring more difficult.

Ram lambs produce a carcass of less desirable conformation with a more or less pronounced strong taste, thereby reducing their market value. Livestock buyers discriminate against uncastrated lambs, and the cut in price is sufficient to make castration a profitable practice.

Castration is not a difficult operation. It should be done on a warm clear day. If the day be cool and damp the lambs become chilled and death may follow. Dry, clean quarters should be provided to prevent infection from manure and filth.

Lambs are usually castrated at between 7 and 14 days of age. When castrated at a younger age, the lambs may lack sufficient strength to withstand the shock. When older than 14 days, severity of the shock is increased and recuperation extended over a longer period.

There are several ways in which castration can be done. One of the oldest and still practised methods is to cut off the lower

third of the scrotum, squeeze the testicles out and remove by pulling beween the fingers or teeth. This method is best used when the lambs are about 7 days of age.

A second method of castration, after one-third of the scrotum is removed, is similar to that of castrating pigs or calves in which the testicles and cords are exposed by cutting the testicular covering before the cords are cut and testicles removed. Difficulty may be experienced when the first few lambs are castrated, but as soon as the positions and manipulations are learned this method of castration becomes simple. This method is used after the lamb is 14 days old.

Immediately after castrating, the empty scrotum should be rinsed out by lifting the scrotum and pouring a mild disinfectant into both cavities. Even though plenty of disinfectant is used, infection may enter. This is indicated by a swollen scrotum that may be easily detected a few days to two weeks after castrating. The enlarged scrotum is due to closing up the wound before all infection has drained out. It should be opened up to allow the necessary drainage, and again disinfected.

The use of a "Burdizzo" for castration is simple. This instrument merely crushes the testicular cords until they are severed without rupturing the outer skin. The testicles are gradually absorbed and disappear. The best results are secured when the right and left cords are crushed separately. It is necessary to re-examine the lambs in a few weeks to make sure the cords were severed in the first operation.

The rubber ring method of castrating consists of applying a ring around the scrotum above the testicles by using a special instrument. The constricting action of the rubber ring stops blood circulation causing the testicles and scrotum to atrophy and drop off. This method should never be used on lambs over 7 to 9 days of age as it will cause severe pain.

SHEARING AND HANDLING OF FLEECES

Sheep are normally shorn only once each year, usually in the spring or early summer, after the cold weather has passed. Earlier shearing will often necessitate some extra provision for shelter or protection to avoid losses, while on the other hand, more or less loss of fleece and discomfort to the sheep results if the wool is left on for any considerable length of time after the warm weather arrives.

Shearing is best done on a bright warm day and when the wool is dry. In order to prevent the fleece from becoming dirty, the

work should be done on a clean floor or sod. In the event these are not available, a canvas will be found very useful.

Two methods of shearing are common. One is by use of hand shears and the other with the machine clipper. The machine method of shearing has proven most rapid, and when the flock is fairly large it will justify the purchase of a hand or power machine. With the use of the machine the fibers are cut closer to the body and a smoother appearance given to the shorn animal than by hand clipping. There is also danger of cutting the animal and making second cuts of fiber.

There is no single procedure for shearing which is recognized as the best. Practically all experienced shearers work with the animal held upon its rump, with the back leaning slightly toward the operator, in which position most parts of the animal's body are readily reached with the shears and less struggling on the part of the animal is experienced. As a rule, the practice is to start by opening up the fleece with a cut extending from the under side of the neck to the belly and from this opening shearing head, neck, legs and the belly. The wool on the sides and the back can then be removed by long sweeping strokes of the shears. The aim of the shearer should be to shear reasonably close to the skin, avoiding cutting the animal, or making second cuts of the fleece and secure a fleece with the neck, back and sides intact to enable proper tying and grading.

The intact fleece should then be placed shorn side down and all dung locks, tags, and low grade wool removed. The sides should be folded in to form a strip not over 2 feet wide, then rolled from rump to shoulder so that the best grade of wool is on the outside. The rolled fleece should be tied only with paper twine, especially made for the purpose. String or binder twine should never be used because fibers that become tangled with wool cannot be removed in the scouring process. Paper twine and large shipping sacks can be purchased from the wool selling agency.

The Canadian Co-operative Wool Growers, Limited, maintains assembling and shipping stations in all provinces in Canada and represents a satisfactory medium through which the wool can be marketed.

TICK CONTROL

In most flocks it is usually necessary to treat all sheep at least once each year to insure freedom from ticks and lice. The most favorable time is in the spring, shortly after the sheep have been shorn. At this time the entire flock—ewes, rams and lambs—should be treated.

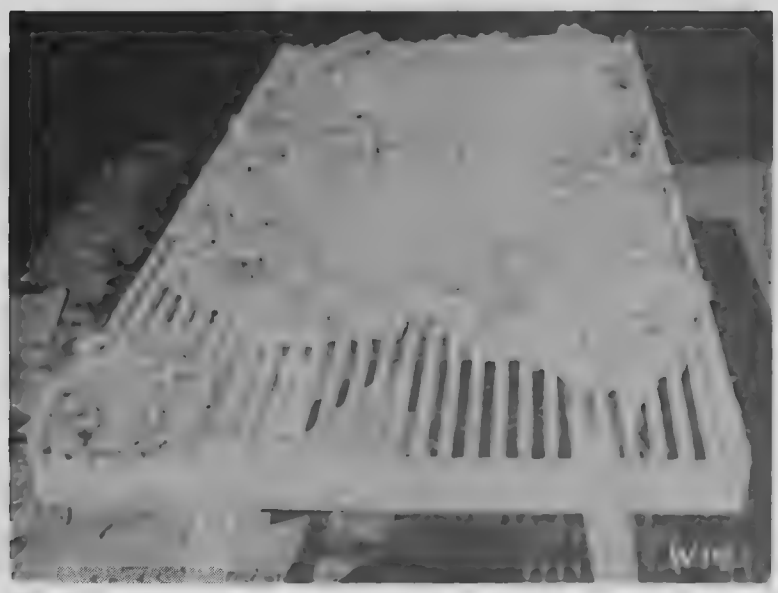


Fig. 20.—A slatted table is excellent for spreading fleeces and removing tags and manure before rolling and tying.

Fig. 21—A screen-top wool table can be used for the same purpose.

The treatment was formerly given by dipping the sheep in a vat containing a solution of insecticide. This treatment is rapidly being changed to spraying the animals. Groups of 20 or more sheep can be crowded into a well drained pen and the liquid insecticide sprayed over the backs of the sheep until the fleece is well saturated.

There are several kinds of insecticides on the market that can be used for spraying, among which are D.D.T., Chlordane, Toxaphene and Lindane. In using any spray the directions of the manufacturer should be strictly followed.

SUMMER FEEDING AND MANAGEMENT

Provided suitable pastures are available the flock may be carried through the season with very little if any supplementary feeding. On some farms there is a certain amount of native pasture available which will provide plenty of grass for the flock throughout the season. Sheep prefer and do best on high land pastures as the vegetation is more palatable and nutritious. Foot-rot is likely to develop when sheep are forced to pasture on wet and low lying land. Summer-fallow and stubble fields may in certain seasons be utilized to help out as a sheep pasture. There are many districts in the Province where most of the land is under cultivation, and under such conditions it may be necessary to plan for pasture crops to meet the needs of the flock.

Fall Rye

This pasture provides the earliest of all cultivated pastures. It is also the earliest pasture to be finished, for as soon as heading takes place it is coarse, unpalatable, and provides little feed. After the rye has been pastured the field may be re-seeded to rape or oats which makes possible the utilization of such fields for a succession of crops during one pasture season. For the best results fall rye should be seeded in the middle of summer the year previous, at the rate of about 3 bushels per acre.

Oats

This pasture induces fair gains for both ewes and lambs. Oats can be seeded in the spring at the rate of 3 bu. per acre as soon as the land is tillable. It should be pastured as soon as it reaches a height of about 8 inches. Unless kept well and evenly pastured the oats will become mature, coarse and unpalatable. During the latter part of the summer oats makes little growth. In some cases it is possible to plow and reseed these fields to rye in August which will provide late fall and spring pasture.

During periods of wet weather oat pasture may be wasted or lost due to rank growth and tramping.

There is an advantage in seeding two or more fields to oats at intervals of 3 or 4 weeks to provide a succession of pastures. After the flock has eaten down the first seeded pasture and been moved to the second, it will be found that in a few weeks, provided there is reasonable moisture, the earlier seeded field will have sufficient second growth for re-pasturing.

Oat pasture can be used as an emergency pasture and cut as oat hay (greenfeed) when not required.

Oats and Rye Pasture

A mixture of 1½ bu. of oats and 1½ bu. of fall rye per acre has proven satisfactory over several years at the University. Although it does not result in the animals making better gains than on oat pasture alone, it provides feed for a longer period—the rye providing fodder after the oats have become mature or fail to provide sufficient growth. Another advantage of this mixed pasture is that it provides an early rye pasture the following spring.

Rape

Rape is one of the best pastures for sheep, both ewes and lambs making more rapid gains than on oat or oat and rye pastures. For fattening lambs after weaning, or ewes for market, or for flushing ewes prior to and during the breeding season, rape can be recommended. It is a middle summer to late fall pasture since the early seeded rape makes slow growth during the cooler spring months. During the warmer months of summer and early fall the growth is rapid so that rape allows heavier pasturing than cereal grains. Seeding broadcast at the rate of from 5 to 6 lb. per acre is the general practice.

Rape may cause bloat when the animals are first placed on the pasture. This is especially true if sheep are turned on while the rape is wet with rain or dew. Placing them on rape when the field is dry and the animals have been liberally fed other feeds will largely eliminate this danger. The animals should soon become adjusted and can be kept on the pasture through rains and heavy dew without danger of bloat.

When sheep or lambs are confined to rape alone there may be more or less scouring. Better results may be obtained from pasturing rape when the flock has also access to a grass field.

Alfalfa

Although alfalfa has proven to be a nutritious pasture crop, it is very likely to cause bloat in sheep. When alfalfa is used as pasture for sheep it is necessary to exercise extreme care. Heavy losses

have been experienced when sheep have been turned on to alfalfa wet with dew or rain. Mature alfalfa is less liable to cause bloat than immature alfalfa. Providing an alfalfa-grass pasture mixture or allowing the sheep access to a grass pasture adjacent to the alfalfa reduces the possibility of bloat. A number of experienced sheepmen in many parts of the Province avoid the use of alfalfa pasture because they are unable to cope with the bloat problem successfully.

Sweet Clover

It is adapted to practically all types of soil and may be more widely grown in the Province than alfalfa. It supplies a large volume of pasturage and is a crop that might very well receive more consideration by sheepmen in Alberta. There is also less danger from bloat than in the case of alfalfa, very little difficulty being experienced in this connection, providing reasonable precautions are taken.

Red Top, Brome, Slender Wheat Grass (Western Rye), Crested Wheat Grass, Creeping Red Fescue

These and other permanent grasses or mixtures of these make suitable pastures for sheep throughout the season. Those crops most suited to the district should be grown. Crested wheat grass is most suitable in the drier areas; red top can be used on heavier, moister soils, while the other grasses grow well under average conditions. Extremely wet soil should not be used as sheep pasture.

Mixed Legume-Grass Pastures

Mixed pastures containing both legume and grass most suitable to soil conditions will provide more forage than any single crop pasture. When alfalfa is used in the mixture it is suggested that not more than 3 lb. of alfalfa seed per acre be included in order to lessen the danger of bloat. Such pasture mixtures can be successfully used if reasonable precaution is taken.

SUMMER CARE

Some form of shelter should be provided while on pasture to protect the animals during severe storms and from the direct rays of the sun. Trees are possibly the best natural shelter, but if these are not available and winter shelters are long distances away from the pastures, temporary shelters may be provided. When placed on well drained ground, straw or board roof shelters open on all sides are satisfactory.

During the summer, sheep should be watered at least once daily, or if possible water should be available at all times. Iodized salt should be provided regularly or made available to the flock

so they may eat it when desired. Coarse stock or block salt can be satisfactorily fed in troughs or boxes but it is advisable to provide some kind of cover to prevent excess loss by rains.

WEANING

Lambs are usually weaned when around 5 months old. At this age the lambs have reached the stage when they will receive no setback providing suitable pastures are available. Weaning at this time allows some time for the ewes to regain flesh and condition before the breeding season arrives. It is also necessary in purebred flocks, when ram lambs are being retained, to wean before the rams have reached the age when there is danger of the ewes being bred.

Since it is desirable to dry up the ewes as quickly as possible, they should be placed on a scant pasture or dry feed. Every two or three days for the first week the condition of the udder should be noted and, if necessary milked out in order to prevent serious udder trouble. After all danger in this connection is over, the ewes should be placed on good pasture to fit them for the breeding season.

At weaning time the lambs should be provided with as good pasture as possible. In case the pasture is not particularly good, grain feeding at this time may be advisable. In purebred flocks ram lambs should be separated from the ewe lambs.

Weaning time affords a good opportunity for culling the breeding flock, for the selection of ewe lambs to be retained, and to compare the relative merits of various rams that have been used during the past season. Such work is best accomplished when breeding records have been kept and lambs have been marked. Errors can be avoided, such as culling ewes that, due to their being heavy milkers and good mothers, are relatively thin and lack condition. Records of the breeding flock are also of material assistance as a basis for the selection of lambs to be kept for breeding. Where more than one sire has been used in the flock the progeny of each can be compared for weight and type and the results used to determine the most satisfactory matings for the following year. Improvement of the ewe flock as well as the lambs is secured only when selection, culling and mating are intelligently made.

LAMB FEEDING

In farm flocks the weaned lambs not being retained for breeding purposes are fattened for market in pasture or drylot. When the lambs are born in January, February or March they can be fattened on pasture alone but sufficient grain is usually fed to permit sale of finished lambs before market prices decline in the fall.

Lambs born in April and May are usually fattened in drylot. However, at the University of Alberta late-seeded oat and rape pastures have provided cheap forage during late September and October. The use of such pastures makes it possible to put weight on lambs cheaply and gives the lighter lambs a good start for drylot feeding.

In certain areas of Alberta the fattening of range-bred lambs has developed into an enterprise of considerable importance. Large numbers of range lambs reach the end of the pasture season in an unfinished condition. These "feeder" lambs are available to be finished on farms where a supply of suitable roughages and grain is available. Over a period of years the rise in price which takes place between September and October, the period when the bulk of the feeder lambs reach the market, and December, January and February, when such lambs are finished for market, makes it possible to carry on such an undertaking on a reasonably profitable basis.

Hand-feeding

When lambs are placed in the feedlot for fattening they should be started on grain gradually, starting with around ¼ lb. per head daily and increasing the amount in easy stages until they are getting 1 to 1½ lb. per head daily at the end of one month. As the lambs increase in weight the amount of grain can be further increased to around 2 lb. per head daily.

The amount of grain that can be safely fed to lambs depends somewhat on the hay consumed. Some feeders limit the amount of hay to induce heavier grain consumption. To reduce the possibility of indigestion or losses due to enterotoxemia care has to be taken not to over feed lambs. Lambs that show symptoms of overeating should be removed from the feedlot and fed limited amounts of feed until they have recovered.

Oats, barley and wheat may be used in finishing rations. Standard recleaned screenings can also be utilized. Lambs prefer grains whole rather than ground. Oats may be used more heavily in the early part of the finishing period than during the latter stages, and barley and wheat may be used interchangeably depending upon their relative price per pound.

During the winter of 1958-59 the range feeder lambs that were fattened at the University of Alberta consumed an average of 1.03 lb. of alfalfa and 1.93 lb. of barley daily and made an average daily gain of 0.452 pounds.

Roughages of good quality should be used in lamb finishing. Alfalfa hay possesses certain properties which make it very valuable

for lamb feeding. Oat greenfeed can be used with fair satisfaction, although best results are secured when it is fed along with a good quality grass hay or alfalfa. When alfalfa or other legume hays are not available and particularly when oat hay is the only roughage fed, supplementation with linseed oil meal or soybean oil meal is recommended. This supplement may be fed conveniently by mixing it with the grain at the rate of 10 lb. to 90 lb. of grain. The price which one is justified in paying for these protein-rich supplements for lamb feeding is governed very largely by the price of grain. In general they are not worth more per pound than twice the value of grain on the farm. The replacement value of protein supplements is a factor which must be carefully considered in making decisions regarding their use.

When the roughage portion of the lamb ration consists of hays other than alfalfa, consideration should be given to the feeding of some form of mineral. Light lambs being heavily fed on grain may suffer from lime deficiency. Allowing such lambs access to a mixture of equal parts ground limestone and cobaltized-iodized salt is recommended.

Self-feeding

The self-feeding of grain to lambs has been considered by most experienced feeders as a dangerous practice because lambs have a tendency to overeat resulting in losses from indigestion or enterotoxemia (see page 50).

It has been found that rations composed of a mixture of ground hay and ground grains can be safely self-fed providing the hay or fiber percentage is relatively high. Better results have been secured when the ration has been pelleted than when fed as meal. The advantages of self-feeding over hand-feeding are in faster gains, more efficient use of feed, and saving in labor. A larger proportion of hay must be fed when self-feeding than when hand-feeding. Disadvantages are the cost of grinding and pelleting as well as the hauling and handling of feed to and from the feed mill. Unless the saving in feed and labor is greater than the added cost of feed preparation, self-feeding will not be profitable.

Experiments are being conducted to determine the kind and type of rations that can be profitably self-fed. While it is agreed that feeds of good quality and balanced rations give best results, the optimum proportion of hay, fineness of grinding, hardness of pellets and other factors have not been established. Results secured at the University of Alberta in self-feeding pelleted rations are shown in the following table. These results were secured in fattening 60 to 70 lb. feeder lambs by hand-feeding long hay and whole grain and by self-feeding pelleted rations.

	Daily Feed Consumption		Av. Daily Gain	Feed Required per 100 lb. Gain	
	Hay	Grain		Hay	Grain
	lb.	lb.	lb.	lb.	lb.
Hand-feeding					
Limiting alfalfa to about 1 lb./day, full fed barley, Av. 3 trials, 1956-57-58	1.08	1.80	.405	272	488
Limiting afalfa to about 1.5 lb./day, full fed barley, Av. 3 trials 1953-54-55	1.53	1.45	.302	510	481
Limiting grass hay to about 1 lb./day, full fed barley plus 10% linseed meal, Av. 2 trials 1956-57	1.13	1.75	.389	291	451
Limiting grass hay to about 1.5 lb/day, full fed barley plus 10% linseed meal, Av. 4 trials 1951-53-54-55	1.54	1.62	.277	597	587
Self-feeding pellets					
45 to 50% alfalfa, 50 to 55% barley, 5% molasses, Av. 3 trials 1955-56-58	1.70	1.88	.457	374	387
60% alfalfa, 35% barley, 5% molasses, Av. 2 trials 1958-59	2.48	1.65	.592	420	278

Fattening lambs should be allowed to consume sufficient water to make satisfactory gains. If lambs are forced to eat snow or to drink ice-cold water they may make slower and less efficient gains.

Lambs in the feedlot should have access to salt at all times. Blue (cobaltized-iodized) salt is recommended. This can be fed alone or mixed with equal parts ground limestone when non-legume hays are fed.

LAMB MARKETING

Consumer demands, supply, price fluctuations and conditions on individual farms have a bearing on the time to market fat lambs.

Market demand is an important factor in determining the most suitable weight at which to sell lambs. Lambs weighing between 90 and 100 lb. are favored. Lambs somewhat lighter, provided they carry the required finish, are acceptable. Buyers discriminate against lambs that are overweight, undocked or not castrated.

The ideal situation would be to have lambs supplied at a steady rate throughout the year. Under Alberta conditions, however, this is not an easy matter. Lambs born in farm flocks are usually slaughtered during September, October and November. Lamb prices often drop during this period of heaviest marketings. Fat lambs slaughtered during the winter and early spring months are mostly those produced on ranches and fattened in commercial feedlots. There is a reasonably steady supply of lambs during this time and prices are usually maintained at a fairly high level. The fact that during the late spring and early summer months comparatively few lambs are available means that prices usually reach the peak at this time.

Since most lambs from domestic flocks are born between February and June, the housing, climatic and feeding conditions under which they are reared vary according to the time of birth. The earliest lambs require better shelters, and must be liberally fed in order to reach an earlier and higher priced market. Little or no use can be made of pasture. March and April lambs require less elaborate shelters. Good use is made of pastures, less grain is fed and the lambs usually reach market in August, September and October. Lambs born in May and June, although requiring little or no shelter when young, usually require an additional feeding period after the pasture season closes.

These differences in conditions mean that there is considerable variation in the cost of producing lambs for early and late markets. The most profitable program for conditions on a given farm must be determined by the operator.

Sheep Diseases

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The following discussion of the more common sheep diseases is intended as an aid in preventing sickness and as a guide in treating sick animals. An accurate diagnosis must be made before treatment for disease control measures to be successful. Therefore, a veterinarian should be called to examine the flock when disease occurs. Sick animals can also be submitted to the Veterinary Laboratory, Alberta Department of Agriculture, Edmonton.

In administering drugs to sheep it is advisable to stand the animal in a corner and elevate its mouth slightly. In this way the danger of pouring the medicine into the lungs, and causing pneumonia, is lessened. A 2-ounce dose syringe is the most convenient instrument to use in administering medicine. The tongue should not be held. The mouth should be kept closed and the animal allowed to swallow the medicine slowly; or a spoon can be used to place the medicine in the mouth.

LAMB DISEASES

Care should be taken at lambing time to prevent chilling or sudden changes in temperature, as the lambs may develop pneumonia. Weak lambs need energy or they may die; give a tablespoonful of corn syrup every 2 or 3 hours until they show more activity; a raw egg will also help supply strength. A teaspoonful of a good grade cod liver oil should be given daily for 2 or 3 weeks to supply vitamins A and D, to increase resistance to disease and prevent rickets.

The navel should be disinfected to prevent infection entering the broken umbilical cord; a small bottle, 1" x 1½", full of tincture of iodine should be kept on hand into which the cord can be dipped; use a fresh solution for each lamb if possible.

Dysentery (White scours, Clostridium perfringens, vitamin A deficiency and toxic waters)

This is a disease of the newborn that occurs within 48 hours or sometimes as long as a week after birth. There is a very fluid grayish diarrhea, an offensive odor, great depression, and the lambs stop nursing.

White scours is essentially filth-borne. Cold, wet, stormy weather is conducive to the disease if the shelters are filthy. Barns and sheds must be frequently cleaned and freshly rebedded. Clipping the long wool from about the udder and inside of the thighs of the ewe is recommended.

Medical treatment is often unsatisfactory. Vitamin A pills or one teaspoonful of cod liver oil should be given daily. Milk, eggs and corn syrup can be given to build up the energy of the lamb. Sulfa drugs or antibiotics may assist in preventing secondary invasion of other bacteria.

In addition to white scours, severe losses have occurred on a few farms in Alberta from Clostridium perfringens Type D infection. Treatment with drugs is useless. One or two injections of an antitoxin effects a high percentage of recoveries. As a prevention, an injection of the antitoxin within 6 hours of birth is excellent. For immunization of older lambs please read instructions under the heading "Enterotoxemia"—page 50.

Some cases of diarrhea have occurred due to toxic drinking water. The water contained too much laxative Epsom or Glauber's salts. Approximately 100 grains per gallon of water of either one or in combination is the maximum tolerance level. When the water is suspected, a quart can be forwarded to the Veterinary Laboratory, Alberta Department of Agriculture, Edmonton, or direct to the Provincial Analyst, University of Alberta, Edmonton, for analysis.

Often the diarrhea is due to a lack of vitamin A in the ewe's ration during pregnancy. A white eye which is blind will also indicate vitamin A deficiency. See page 24 for proper rations.

Stiff Lamb Disease

This is a disease that occurs from 3 to 10 weeks of age. The disease is not infectious. It appears usually among winter or early spring lambs which are confined. As a result, their exercise and diet are restricted. A stiffness or paralysis of the legs is the most common symptom. Post-mortem examination reveals grayish or white streaks in the muscles, especially those of the legs.

A teaspoonful of 10% phosphoric acid given daily for 4 days in milk effects a cure in some cases. Vitamin E effectively cures many.

Goiter

This disease is quite prevalent in certain sections of Alberta, especially in the vicinity of the foothills. Lambs usually show an enlargement of the thyroid gland in the region of the throat. Many are born dead; some are weak and die within a few days. The

cause is a deficiency of iodine. Unless the breeding ewes get a sufficient amount of this mineral, serious results follow.

Goiter can be prevented by the administration of potassium iodide daily for 3 months before lambing. Dissolving 4 oz. of potassium iodide in as small a quantity of water as possible and sprinkling it over 100 lb. of coarse salt is a convenient way of administering the drug. Potassium iodide has been given by dissolving ½ oz. for each 100 ewes in the drinking water that this number will consume daily. One per cent iodized salt in the ewes' ration also gives good results. In the case of lambs born with an enlarged thyroid, painting the surface of the enlargement once a day with a soft brush dipped in tincture of iodine may reduce the gland to normal size.

Cobalt Deficiency

Sometimes lambs are unthrifty, anemic, and have a dry wool. If no bacterial or parasitic diseases are present, cobalt deficiency could be suspected. The feeding of cobaltized-iodized salt is the best preventative measure. In deficient areas, cobalt should also be fed to the pregnant ewe.

For treatment of acute cobalt deficiency, dissolve ½ oz. of cobalt sulfate or chloride in one gallon of water; give a teaspoonful daily for 5 to 7 days. After that the use of cobaltized salt should be sufficient.

Enterotoxemia (Feedlot disease, overeating disease, pulpy-kidney disease)

Enterotoxemia is an acute intoxication resulting from the elaboration of toxin by a bacterium known as Clostridium perfringens type D. It is a combination of a nutritional problem and an infectious disease. A sudden alteration in the food supply, usually from a poor to rich one, or the ingestion of large quantities of highly nutritive feedstuffs, appears to be necessary to initiate the disease. Heavy feeding activates the organism by providing excellent conditions for its growth, multiplication and toxin production.

Lambs on luxuriant pasture, feedlot lambs on heavy grain rations, and young lambs nursing heavy-milking ewes are those most generally affected. Lambs usually die suddenly and symptoms are often not observed under field conditions.

The most frequently observed symptoms are diarrhea, listlessness, staggering, convulsions, and coma. An affected animal may rapidly become weaker and show signs of disturbance of the central nervous system such as circling, throwing back of the head, or pushing against an object. Death usually occurs within 8 hours

after the onset of symptoms. The death rate of affected lambs is often 100%, and a flock loss of 25% is common.

Post-mortem examination may reveal an excessive amount of straw-colored fluid in the sac surrounding the heart, hemorrhages on the heart, and moderate congestion to areas of acute inflammation on the bowel. If autopsy is delayed for a few hours the kidneys will be soft and pulpy, hence the name pulpy-kidney disease.

Enterotoxemia may be mistakenly diagnosed as hemorrhagic septicemia, coccidiosis, or plant or chemical poisoning. Therefore, an accurate field diagnosis must be based upon the history of sudden deaths in lambs exposed to rich feed and the demonstration of the aforementioned conditions. Laboratory examination by a veterinary pathologist is desirable.

Lambs entering a feedlot should not be put on heavy feed immediately but gradually brought up to the heavier ration.

Vaccination is a satisfactory preventative measure, using Clostridium type D bacterin or toxoid. It must be confined to healthy lambs over 2 months of age. Lambs under 2 months of age may not respond to immunization. The practice of vaccinating the pregnant ewe 1 to 2 months before lambing is reported to provide protection to the baby lamb for 1 or 2 months. For lambs going into the feedlot, vaccinate with this bacterin or toxoid 10 days to 2 weeks before commencement of heavy feeding.

Experience in Alberta indicates that on farms where this disease is a problem causing a severe dysentery in newborn lambs, the heavy death loss can be prevented by injecting the lambs within the first 6 hours of birth with Clostridium perfringens type D antitoxin, followed by bacterin or toxoid at 2 to 3 months of age.

DISEASES OF THE EWE

Pregnancy Disease

This is an ailment of pregnant ewes, especially those carrying twins or triplets, occurring during the last month of pregnancy and is more common with ewes on dry feed with limited exercise. The exact cause of the disease is not fully understood. The above mentioned factors all appear to be more or less involved.

At first the affected animals stand off by themselves or lag behind the flock, become dull and weak, urinate frequently, and grind their teeth. The breathing may become faster and nervousness commonly develops. The ewe may be stupid or excitable, and appears to be blind. She refuses feed and drinks little water, becoming weaker and weaker and finally unable to rise. Lambs born at this time are apt to be weak and unthrifty and in many cases die.

The ewes at lambing time should be in a good thrifty condition, neither thin nor overly fat. A good ration will also build up resistance and energy in the developing lambs so that they are born thrifty. See page 24 for pregnant ewe rations.

Treatment of the disease as it occurs in the lambing shed is seldom successful, though some animals may recover if taken in hand early. Calcium gluconate or dextrose solution may be given intravenously, or molasses, corn syrup or pure dextrose given in the drinking water or as a drench.

Dystocia (Difficult lambing)

Most difficulties in lambing are due to abnormal presentation of the lamb. A knowledge of how normal lambing takes place is helpful in determining the treatment or assistance required.

Previous to lambing there should be an enlargement of the external opening, sufficient for the lamb to be expelled. After a few minutes of straining, the water bag should appear and rupture. The front feet appear with the head between, followed by the body with the hind legs extended. If the lamb is being normally presented, it is only in exceptional cases that it is necessary to give assistance. However, in the case of large lambs and young ewes, some help may be advisable. When it is reasonably assured that the ewe will be unable to expel her lamb by her own efforts, it is time for the attendant to render assistance. Pull on the feet in unison with the straining of the ewe. Except in extreme cases, excessive force is not advisable on account of the danger of causing internal injury to the ewe.

There may be several forms of abnormal presentation, such as the head and one, or both, of the front feet turned back, coming hind end first, the lamb turned on its back, or twin lambs being presented at the same time. The general practice is, if possible, to correct the position of the lamb. First wash the hand and arm with disinfectant, smear the hand with vaseline and then work it slowly into the vagina. After the position of the lamb has been corrected, delivery will usually take place without additional help. Difficult cases may arise when it is impossible to get the lamb in the normal position, and under such conditions the best one can do is to obtain delivery with as little injury as possible to the ewe. External lacerations should be treated with a disinfectant salve or ointment. If internal lacerations have occurred, the uterus and vagina should be flushed with a warm solution of one part creolin and 50 parts of water. Sulfa drugs and antibiotics are useful.

Many of the lambs that cannot possibly be born normally due to their size or abnormalities of the pelvis of the ewe, etc., can be delivered by a Cesarean operation performed by a veterinarian.

His services should be obtained early before the ewe becomes too weak to be a good surgical risk.

Eversion of Uterus

This condition is occasionally met with, usually following a difficult parturition and where there has been considerable irritation of the parts. After the lamb is born the ewe continues to strain until the uterus is forced out and hangs in a large mass from the vulva.

The displaced uterus should be carefully washed with a warm 2% solution of carbolic acid and then carefully pushed into place. The animal will struggle while this is being done, but it must be restrained until the parts are all back in their normal positions. In replacing the everted uterus, the closed fist should be placed beneath the mass, which should gradually be pushed up into the vagina. Sutures through the skin on each side of the vulva, and passing over the opening, will often prevent a recurrence. These stitches should be removed after the animal ceases straining.

Mastitis (Blue bag)

This is also called mammitis, garget or inflammation of the udder due to disease bacteria causing an inflammatory condition of the milk-secreting cells and other tissues in the udder. It is common in early spring, when the flock is on succulent pasture. As a rule, it occurs only in a mild form, but occasionally it is gangrenous.

In many cases the gland is hard, swollen and tender, often pitting on pressure. There may be loss of appetite, restlessness, and pain when the ewe is suckled. The udder may be dark red or purplish in color. The milk secretion is changed and may be either thick, stringy and streaked with blood, or again it may be only a watery fluid. Unless care is taken, the internal structures of the quarter affected may be destroyed. Where the milk secretion is stopped, the flow may or may not return at the next lactation.

The affected animal should be removed at once from the flock and the lamb taken from her immediately. The udder should be milked frequently and hot applications applied. A treatment highly recommended is the dissolving of ½ lb. of Epsom salts in a quantity of warm water. The ewe is placed upon her rump, and absorbent cotton or a bath towel is dipped in the solution, which is applied to the udder. Apply camphorated oil or iodine ointment and massage thoroughly into the udder. Sulfa preparations given by mouth, or by syringe in very sick animals, will prevent the infection from becoming a general blood poisoning of the system. It is well to check with a veterinarian concerning the dosage because overdosing with sulfa drugs will ruin the kidneys and result in the

death of animals. Penicillin combined with streptomycin, aureomycin or other antibiotic ointments, inserted into the quarter will help cure many infected quarters provided that treatment is started early. In some cases the infected quarter should be removed surgically by a veterinarian to save the life of the ewe.

INTERNAL PARASITES

Grub in the Head

Grub in the Head is also known as the sheep bot, sheep gadfly and grub worm. The sheep gadfly, "Oestrus ovis," attacks pastured sheep in the heat of the day, depositing its eggs in the sheep's nostrils. When hatched the worms crawl up into the sinuses of the head where they develop into full grown grubs.

When the sheep are attacked by the fly they shake their heads, stamp, and thrust their heads on the ground; they huddle together under trees or other shelter, holding their noses under one another to prevent an attack. In the spring when the adult larvae, or grubs, loosen and pass out, the nasal catarrh is characterized by sneezing and a dirty discharge.

Relief is best obtained by prevention. Gadflies rarely enter buildings, and if a darkened shed is provided the sheep may avoid attack. The noses may be smeared with tar. This is done with the use of logs containing holes 2½ inches in diameter, bored 4 inches deep, at intervals of about 6 inches; salt is placed in the holes and tar is smeared around them.

Stomach Worms

This is one of the most serious ailments affecting sheep in Alberta. Dullness, lowered vitality, anemia and swelling under the lower jaw are the most frequent symptoms.

Phenothiazine is one of the most effective drugs. Administration during the winter will destroy the worms and prevent the pastures becoming contaminated. Phenothiazine may be given any time between the first of February and one month before lambing, or from 5 days after lambing to 24 hours before turning out to pasture. Treat all the adult sheep in the winter or spring, including the ram. When the pastures are contaminated with internal parasites, treatment should be given during the summer and again in the fall. Phenothiazine is obtainable from your veterinarian, Wool Growers' Association, or other organizations. Phenothiazine in coarse salt 1:9 by weight will help in control.

How to Administer the Treatment

Where the services of a veterinarian are not available, the following instructions should be closely followed:

1. Pen the sheep quietly and securely for treatment.
2. Sheep do not need to be starved before or after dosing.
3. If treatment is given just prior to turning the flock to summer pasture, the flock should be held for at least 24 hours to give the drug a chance to act so that there is no danger of contaminating the pasture.
4. The sheep should be held between the legs of an assistant so that the neck, not the shoulders, is between the knees. Avoid slippery floors and place the hind quarters in a corner or against a wall. The main object is to prevent the animal from sitting down, from moving the body from side to side, or from swinging its head sideways.
5. To hold the mouth open, use a mouth spreader with a spread of about 2⅜ inches to 2½ inches. Endeavor to administer the tablet when the animal is not struggling violently.
6. The person giving the tablets opens the animal's mouth and inserts the mouth spreader so that the tongue is held forward underneath the lower bar of the spreader. Holding the tablet between the thumb and the first two fingers, the tablet is then brought well down to the root of the tongue by the fingers, when it is released and pushed over the "hump" of the tongue by the center finger. To assist swallowing, the spreader is quickly taken out of the mouth and the assistant releases the pressure from the sides of the head and neck so that the animal can lower its head. The operation is repeated carefully for each tablet. A balling or pilling gun speeds the treatment of large numbers of sheep. Four tablets can be given to a sheep by an experienced doser in 30 seconds.

Careless or inexpert dosing may result in the accidental introduction of a tablet into the larynx; in such a case, the sheep should be given a drench of water and should be shaken with its head down. Always keep handy a drenching bottle filled with water.

No Danger from Over-Dosing

Phenothiazine is not a poisonous drug. There is little or no danger of over-dosing. Pregnant ewes and those nursing young lambs have not shown any harmful effects from the treatment, either in the case of ewes or of lambs. Pregnant ewes should not be treated with the tablets any closer than one month before lambing, and treatment should be deferred for at least 4 or 5 days after lambing.

Discoloration of Wool

The urine of treated animals contains large amounts of a red stain for four days after dosing. With ewes that are not shorn, a

part of the fleece may be permanently stained. The flock should be kept in a well-bedded pen or yard; avoid bare floors or yards with a heavy clay or otherwise impervious surface; have the flock shorn and then treated 24 hours before being turned to summer pasture. Stains on lambs are not serious, as they will grow out.

Drenching

For summer treatment and in areas where phenothiazine is not available a satisfactory treatment for the stomach worm and the black scour worm is the copper sulfate-nicotine sulfate drench given at 45-day intervals, the mixture being made up as follows:

Copper Sulfate (Blue Stone)	1½ ounces
40% Nicotine Sulfate	1 ounce
Soft Water	½ gallon

Heat the water and dissolve the copper sulfate in it. Add the nicotine sulfate immediately before use, as the mixture will not keep.

In preparing this solution, only clear, blue copper sulfate crystals should be used; remove all whitened crystals; mix thoroughly, using glass, crockery or enamel ware as containers. Blue stone should not be mixed in metal dishes.

Doses—Adult Sheep	2 ounces
Grown Lambs	1 ounce
Smaller Lambs	½ ounce

It is not necessary to starve the sheep before drenching, but they should not be allowed to drink water for two hours after treatment. In dosing, the animal should be held with the head between the knees of the doser, so that it does not struggle and the head is not held too high.

This treatment should be repeated every 45 days throughout the grazing season.

Nodular Disease

This is caused by young worms picked up with the grass from contaminated pastures. The worms enter the walls of the intestine, where nodules or knots are formed. When present in great numbers these cause serious interference with health and result in unthrifty sheep.

The eggs and young worms on contaminated pastures are destroyed by the long winter frost and weather conditions; but in the intestine of the sheep, the worms develop to maturity during the winter months and begin laying the eggs which contaminate the pastures each spring. To prevent this recurrence and to protect the lambs it is necessary to destroy the egg-laying worm in the adult sheep before the animals reach the pasture in the spring. Phenothiazine is effective in destroying all or most of these worms.

Tape Worm

The tape worm, *Monieza expansa*, is common in the intestinal tract of lambs and may be several feet in length. Lambs, heavily infested, become unthrifty, weak and emaciated. Segments of the tape worm are frequently seen in the feces. Some lambs show diarrhea in the early stages and anemia may develop gradually.

The copper sulfate and nicotine sulfate, as described for stomach worms, is the treatment recommended.

Lungworm

Fortunately, lungworms appear to cause disease only when other more serious troubles exist. Treating for other worms, if present, good husbandry and feed, and avoiding low-lying contaminated pastures all aid in building up affected sheep into good flesh. An effective drug is available from veterinarians for treatment.

EXTERNAL PARASITES

Sheep Scab

This disease is caused by the parasite *Psoroptes communis ovis*, and is one of the most serious diseases known to sheep. As it is classified as contagious, government officials should be notified at once, the affected animals quarantined and the disease checked at the earliest possible moment.

The symptoms of scab are small inflamed areas where the mite irritates the skin with intense itching and the formation of pustules. The itching increases until the animal appears to be never at rest, and loses weight rapidly. The wool becomes taggy and falls out, especially along the flanks and back, exposing large areas covered with crusts, and with the accompanying rubbing and scratching.

The proper procedure is to isolate all infected animals, and report to the Health of Animals Branch, Canada Department of Agriculture, so the animals can be treated with the proper solution under careful supervision.

Sheep Ticks (Sheep Ked)

This is the most common external parasite found in Alberta. It causes great irritation, especially in lambs. Ticks are blood suckers and result in stunting and general unthriftiness. Wool, heavily infested with ticks is soiled and dirty.

Sheep ticks are destroyed by dipping with a reliable commercial dip or spraying with DDT or some other chlorinated hydrocarbon insecticide. DDT has the advantages of low cost, relative safety, and residual effect; use at the rate of 8 lb. of 50% wettable powder per 100 gallons of water; mix with a box of wetting agent (any common laundry detergent). Sprayer pressures as low as 75

to 100 lb. are satisfactory. Wet thoroughly using 2 quarts per animal, making sure to get coverage on the back and around the neck. One treatment, preferably after shearing, is usually effective. A second treatment within 14 days will ensure destruction of the new keds. When the flock is cleaned up, treatment every 2 or 3 years is sufficient.

Lice

Two kinds of lice may infest sheep—the biting, and sucking or foot louse. In Canada only the biting louse is of importance. It may occur on any part of the body, but usually on those parts covered with wool; the irritation may be so severe as to seriously interfere with feeding and resting. As a result animals may fail to put on weight, and young sheep may be stunted. Infested animals constantly rub against objects, scratch, bite at themselves, and the wool becomes ragged and torn.

Lice spread very rapidly through direct contact and from buildings used to house lousy animals.

A variety of commercial preparations are available for treatment, such as rotenone, DDT, Lindane, methozychlor, and others. The manufacturers instructions must be followed exactly. Many new preparations are becoming available, and care should be exercised in their use. Clean out all bedding and rebed with clean material.

MISCELLANEOUS DISEASES

Foot Rot

This disease is quite common and usually starts in wet weather with sheep standing in mud, or being pastured on low lying land.

Considerable inflammation and soreness around the top of the hoof, a well marked lameness, separation of the hoof and small gangrenous spots appearing between the claws of the foot are the symptoms.

The foot should be cleaned thoroughly; where abscesses are forming, poultices may be applied and the swellings opened to allow the pus to escape. The foot should be treated with an antiseptic solution such as a 5% solution of carbolic acid or a 2% solution of creoline. A large number of sheep may be driven through a trough containing several inches of copper sulfate solution. One pound of this drug to a gallon of water is usually quite effective. The flock should be removed to clean, dry pasturage at once. Consult your veterinarian about the use of the sulfa drugs and antibiotics in treating this disease.

Sore Eyes

Disorders of the eyes are not very common in this province. Inflammation may occur as a result of dust, injuries and occasionally

the pollen of certain flowers. It may appear also in conjunction with diseases, such as nasal catarrh and grub in the head.

On certain farms it assumes an enzootic form, affecting several animals. The first symptom will probably be a profuse discharge of tears; the eyelids become swollen; the eye becomes clouded with temporary blindness. In bad cases a small red spot may appear near the center of the eye-ball. In some animals both eyes may be affected at the same time. The eye-ball may become clouded or milk-white and in bad cases it may ulcerate and rupture.

Isolate the animal and place in a dark shed. A few drops of a solution of nitrate of silver, one to five grains to one ounce of distilled water, should be placed in the eye once a day for several days. The placing in the eye of a 10 to 20% solution of argyrol is recommended. Cold applications, such as bathing the eye with wads of absorbent cotton saturated with very cold water, will also be beneficial. Some of the sulfa and antibiotic ointments are very effective in treating this condition.

Stomatitis (Sore Mouth)

Stomatitis is an inflammation of the mouth. There are so many different forms of this trouble that space will not allow the description of each one separately, but the catarrhal type, or simple redness of the mouth, is the one most frequently seen. If the case is neglected or improperly treated, the tissues will undergo changes that may develop into a most serious condition.

Inflammation of the mouth may occur after injury by sharp parts of plants, such as beards or awns. Chemical irritants may likewise cause it, particularly such as are applied externally as medicines. Occasionally sheep may drink solutions containing disinfectants and considerable inflammation will result.

The milk of animals suffering from certain diseases may produce inflammation of the mouth of the young lamb. Poisons contained in certain plants such as mustard and hemlock, and occasionally fresh clover and insufficiently dried hay, may cause it. It is also claimed that feed infected with various fungi is particularly prone to cause inflammation.

The mouth will be hot, red and sensitive, with the animal chewing its food in a careful and deliberate manner; thirst is increased; the membrane of the mouth may show yellowish-gray ulcers which generally cast off shreds of false membrane; ulcers may extend over the lips and nose. The tongue may swell considerably, and saliva dribble from the mouth; the animal soon loses flesh and there is a well marked unthrifty appearance. In young lambs the disease is often rapid and fatal, but older animals usually recover.

In most cases a regulation of diet and removal of the causative factors are all that is required to bring about a speedy recovery. The diseased sheep should be fed on green feed, fine hay and if necessary, bran, gruel or beet pulp. Affected animals should be separated from healthy ones. Allow plenty of fresh water, as it enables the animal to rinse the mouth. The mouth should be swabbed out twice a day with a potassium chlorate solution of 1% to 3%, or alum ½% to 2%, or a hydrogen peroxide solution of 3%; use a metal syringe. Beneficial results may also be obtained by dissolving 2 tablespoonfuls of boracic acid in each pail of drinking water.

Some serious forms of scabby mouth are due to a virus infection. An autogenous vaccine made in a veterinary laboratory aids in immunizing the remainder of the flock.

Maggots

Sheep are very susceptible to maggot infestation. Maggots are the larvae stage of a fly, found in the vicinity of stables and barnyards. The fly deposits the larvae on the surface of wounds, where they work their way into the flesh causing excessive sores, which may result in the death of the animal. The tails of undocked lambs are favorite locations for maggot infection.

There is considerable irritation manifested by the animal rubbing the affected part. This area has a lifeless and spongy appearance, and when it is opened the living parasites are quite easily found in the decomposing tissues. The condition occurs only during hot summer months.

Cleanliness is the first essential in the treatment of this trouble. Clip the wool carefully from the vicinity of the wound; remove the dead or diseased tissues as well as the parasites; wash with a solution of carbolic acid, one part to 20 parts water; a mixture of ether and sweet oil is probably one of the most effective remedies; solutions of Creolins, Kreso or Izal may be used. In cases of injury the application of pine-tar or equal parts of lard and sulfur will prevent the larvae from gaining entrance into the body.

Wounds

On account of the fleece, hemorrhage from wounds as a rule is not excessive, the wool quickly matting and causing coagulation of the blood. The parts should be carefully washed with some antiseptic solution and all dirt and foreign substances removed, the edges of the cut drawn together and held in place by either bandages or stitches. Astringent solutions such as alum or lead acetate may be applied. If excessive hemorrhage has not occurred, the parts may be smeared with ordinary pine-tar. Powdered sulfa-

nilimide should be placed in the wound to prevent infection; spray with a fly repellant to prevent maggot infestation.

Indigestion, Bloat

Indigestion in sheep frequently takes the form known as bloat. It is generally due to sudden changes of feed, and is most often seen when hungry sheep are turned into clover, rape or alfalfa, or allowed to have access to frozen turnip tops, frozen roots or an overdose of grain. It frequently affects a considerable number of animals at once. A reliable remedy is to give six ounces of raw linseed oil, to which has been added one-half an ounce (one tablespoonful) of turpentine.

If the distension with gas is extreme, the paunch may be tapped with a trocar and canula. This is done on the left side at a point midway between the point of the hip and the last rib, and a similar distance from the transverse process of the backbone, which may be felt towards the upper part of the paunch. Be careful in locating the seat of operation, as otherwise serious injury may result to the internal organs. The wool should be carefully parted so as to avoid carrying strands into the wound to cause subsequent irritation and infection. The trocar and canula should be directed down and forward towards the knee of the right foreleg. Insert right to the hilt so that when the paunch wall collapses the canula will still be in the paunch, enabling further gas to escape. It can be taped in this position for an hour or two if necessary. Keep a trocar and canula where it can be found at a moment's notice. In an emergency, puncture the paunch with a pocket knife, rather than let the animal die, but the practice cannot be recommended as some of the paunch contents are almost certain to escape into the abdominal cavity. In these cases a small ¼-inch or even a ½-inch tube of rubber, copper, steel, etc., can be inserted and tied into place, to assist the gas to escape and help prevent food escaping out of the paunch into the abdominal cavity.

Constipation

This condition occasionally occurs in sheep, especially when kept on coarse, dry feed. Lack of water and insufficient exercise may also be a cause of the trouble. The usual symptoms are loss of appetite, the cessation of chewing the cud, lying down, not drinking, restlessness and colicky pains. Give 6 to 8 ounces of raw linseed oil, together with 2 or 4 teaspoonfuls of turpentine. Allow plenty of water; mineral mixtures containing salt should be available. Feed a diet that is more laxative by including bran and linseed meal in the ration.

Diarrhea

Diarrhea is usually a symptom of some other condition, which has produced an irritation of the stomach or intestinal canal; the result of bad management or overfeeding with succulent food, or an indigestible diet, such as spoiled or frozen feeds, mouldy grains, poisons, intestinal parasites or some infection.

Separate sick animals from the rest of the flock; put the well sheep on new pasture; affected sheep may be given a laxative of 4 oz. of castor oil; should the diarrhea persist give some flour gruel combined with whites of eggs and a little stimulant. Should the diarrhea be due to intestinal parasites, it will be necessary to treat the sheep for such worms. In any case of diarrhea locate the cause and remove it.

Pneumonia

The more common causes of bronchitis and pneumonia are: exposure to wet, cold weather, shearing and dipping during cold weather, and inhalation of gases and dust. It is more frequently seen in lambs than in adults.

The sheep has a listless, dejected appearance; appetite is affected; temperature is elevated. There may be a painful cough and discharge from the nostrils.

Separate affected animals. Provide comfortable, well ventilated quarters and supply appetizing food. If the wool has been clipped off, apply a mustard plaster to both sides of the chest. Good care and nursing are very essential. Consult your veterinarian regarding the use of the sulfa drugs or antibiotics in treating pneumonia.

POISONS

Losses due to poisons fall into three classes: mineral, vegetable and animal.

Mineral Poisoning

It occasionally happens that alkali poisoning causes considerable loss in sheep with access to a slough containing a high percentage of alkaline salts. The animals become hot, thirsty, and drink large quantities of the water, developing colicky pains, enteritis, frothing at the mouth and nose, bloody diarrhea, collapse and death. The administration of large quantities of vinegar, raw eggs, gruel and oily preparation may aid in bringing about recovery. Frequently the effects are too advanced for a satisfactory recovery.

Other poisons are, lead, sheep dips, arsenic etc.; consult a veterinarian immediately.

Vegetable Poisoning

Under this heading come poisonous plants, such as death camas, loco, larkspur and water hemlock. Space will not permit discussing this subject to any extent, but the bulletin "Weeds Poisonous to Livestock", prepared and distributed by the Provincial Department of Agriculture, obtainable upon application, covers this subject fully. The treatment for all plant poisonings is to administer large quantities of stimulants such as sweet spirits of nitre, or whiskey, along with a mixture of potassium permanganate and aluminum sulfate, in 10 grain doses of each. Tannic acid is a well known antidote for many vegetable poisons. Give a laxative.

If ensilage becomes mouldy it may be a dangerous poison for sheep. The symptoms develop rapidly, and include violent colic, intense inflammation of the digestive tract, diarrhea, convulsions and death. Treatment is usually unsatisfactory. Gruels and warm, sweet milk, containing beaten raw eggs, are soothing, nourishing, and worthy of a trial.

Animal Poisons

Snake bite poisoning is seen occasionally in Southern Alberta. The symptoms are: swelling, intense local inflammation, accompanied by depression, weakness, feeble pulse, difficult breathing, stupor or convulsions. The bitten part should be incised and bleeding encouraged. Potassium permanganate in a 5% solution may be applied into and around the wound. Stimulants, such as alcohol, coffee and aromatic spirits of ammonia, should be administered.

Bites from insects such as wasps and bees at times set up severe local irritation. To produce serious general effects, the poisons would have to be introduced into the victim in large quantities, as when an animal is stung by a swarm of bees or wasps. The proper treatment would be to wash the parts with ammonia solution or permanganate of potassium, well diluted, and to give some of the common internal stimulants.

Scrapie

Scrapie is caused by a filterable virus. It represents a chronic neurosis characterized by symptoms of intense and progressive itchiness, progressive debility, and incoordination; the course may extend over several months; invariably it ends in death; all breeds of sheep are susceptible. The exact method of elimination of the virus from the infected animal is not known.

The symptoms of the disease are slow to develop. The sheep are nervous, apprehensive, and more excitable than usual; slight tremors in the head and neck are observed; the animal becomes tense with excitement when moved; rapid muscular tremors, affect-

ing the thighs and flanks, are manifest; the head and neck are carried high and stiffly; the facial expression is staring and fixed; the ears frequently assume unnatural positions; grinding of the teeth is common. The wool loses luster and becomes dry.

The outstanding symptom is that the animal rubs against fixed objects. At first the owner may suspect that the animal is infected with scabies, but a close examination of the skin discloses no evidence of the mites. The scratching usually begins in the region of the rump, particularly around the tail head, and gradually extends over the sides, shoulders, and neck. When the sheep is rubbed by the hand over the loin or rump, it will usually show a definite "scratch reflex"—nibbling movements of the lips and sometimes vigorous wagging of the tail.

The itch becomes more intense as the disease progresses and the animal spends a great deal of time rubbing. One can see evidence of this rubbing on fences and sides of buildings where pieces of wool hang. The skin of the animal will show no evidence of any diseased condition, except possibly abrasions from the scratching. Some sheep do not rub their wool but bite the skin on their legs and pull wool with their mouths.

The temperature of the infected animal remains normal throughout the course of the disease; thirst is a frequent symptom; there is no diarrhea; bleating is weak and tremulous.

The animal's appetite remains good but the sheep gradually loses weight, becomes weak, and walks with a staggering gait. It may fall after running a short distance, particularly if it tries to jump over objects on the ground. Eventually it will be unable to stand, lying on its side and making running movements of the feet. It will continue to eat in this position if feed is within reach.

The course of the disease varies in duration, from 6 weeks to 6 months before the animal dies. Instances are known in which the animal dies within 14 days after the first symptoms are noticed.

The number of animals infected in a flock usually varies from 4 to 20 per cent although it is possible that 50 per cent of the flock may be affected, or there may be only an occasional case over a period of several years. As the disease has an extremely long incubation period, seldom does an animal under 18 months show symptoms. Animals as old as 11 years have been infected.

This disease is reportable under the Federal Animal Contagious Diseases Act. Suspected cases should be reported to the closest veterinarian or direct to the Health of Animals Division, Canada Department of Agriculture. Proven infected flocks are slaughtered and compensation paid.

GESTATION TABLE FOR SHEEP

(Based on 146-day period)

The average for 707 gestation periods was between 146 and 147 days

MONTH BRED

Day of Month Bred	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
	DATES DUE											
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1	27	27	25	25	24	25	24	25	25	24	27	26
2	28	28	26	26	25	26	25	26	26	25	28	27
3	29	29	27	27	26	27	26	27	27	26	29	28
4	30	30	28	28	27	28	27	28	28	27	30	29
		July										
5	31	1	29	29	28	29	28	29	29	28	31	30
	June									Mar.	Apr.	May
6	1	2	30	30	29	30	29	30	30	1	1	1
7	2	3	31	31	30	31	30	31	31	2	2	2
			Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.			
8	3	4	1	1	1	1	1	1	1	3	3	3
9	4	5	2	2	2	2	2	2	2	4	4	4
10	5	6	3	3	3	3	3	3	3	5	5	5
11	6	7	4	4	4	4	4	4	4	6	6	6
12	7	8	5	5	5	5	5	5	5	7	7	7
13	8	9	6	6	6	6	6	6	6	8	8	8
14	9	10	7	7	7	7	7	7	7	9	9	9
*15	10	11	8	8	8	8	8	8	8	10	*10	10
16	11	12	9	9	9	9	9	9	9	11	11	11
17	12	13	10	10	10	10	10	10	10	12	12	12
18	13	14	11	11	11	11	11	11	11	13	13	13
19	14	15	12	12	12	12	12	12	12	14	14	14
20	15	16	13	13	13	13	13	13	13	15	15	15
21	16	17	14	14	14	14	14	14	14	16	16	16
22	17	18	15	15	15	15	15	15	15	17	17	17
23	18	19	16	16	16	16	16	16	16	18	18	18
24	19	20	17	17	17	17	17	17	17	19	19	19
25	20	21	18	18	18	18	18	18	18	20	20	20
26	21	22	19	19	19	19	19	19	19	21	21	21
27	22	23	20	20	20	20	20	20	20	22	22	22
28	23	24	21	21	21	21	21	21	21	23	23	23
29	24	...	22	22	22	22	22	22	22	24	24	24
30	25	...	23	23	23	23	23	23	23	25	25	25
31	26	..	24	.	24	....	24	24	....	26	..	26

Example: If a ewe was bred on Nov. 15th the date she will be due to lamb may be found by glancing at the figure 15 on the left hand column, headed "Day of month bred", and then following across to the right on this line until the column headed November is reached. The day and month of lambing will be found in this column. For specific example note the months and figures marked (*). Ewe bred Nov. 15th due to lamb April 10th.

Date Due

		DUE CAM APR 13 '80	
G.SCI MR 11 '77			
MAR 11 RETURN		APR 15 RETURN	
MAR 14 RETURN			
CIRC MR 2 '73			
MAR 5 RETURN			
CIRC JN 3 '74			
JUN 5 RETURN			
CIRC SE 30 '76			
SEP 30 RETURN			
DUE CAM FEB 16 '79			
FEB 11 RETURN			
CIRC FEB 19 '79			
FEB 14 RETURN			

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